MAR 2 1929

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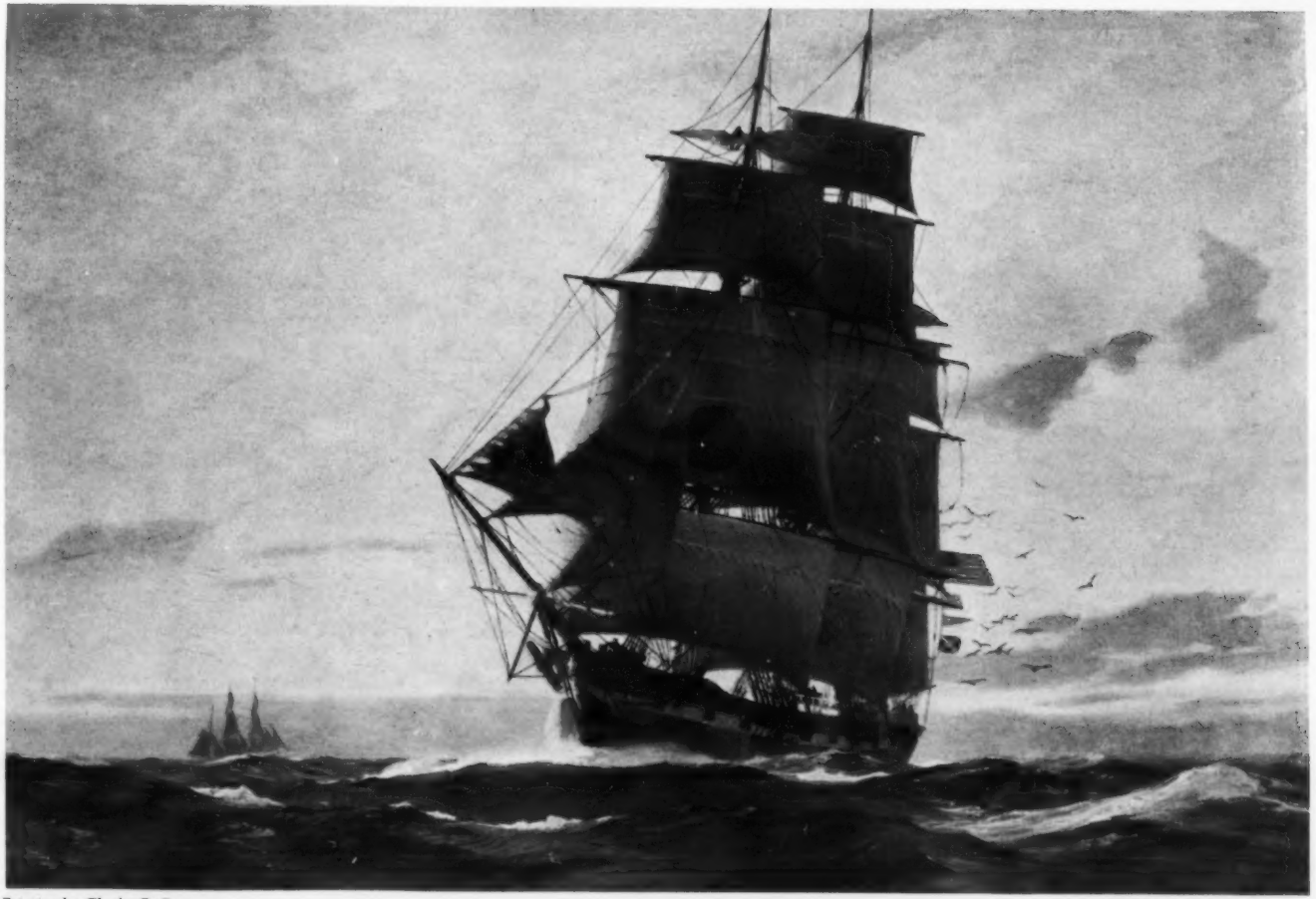
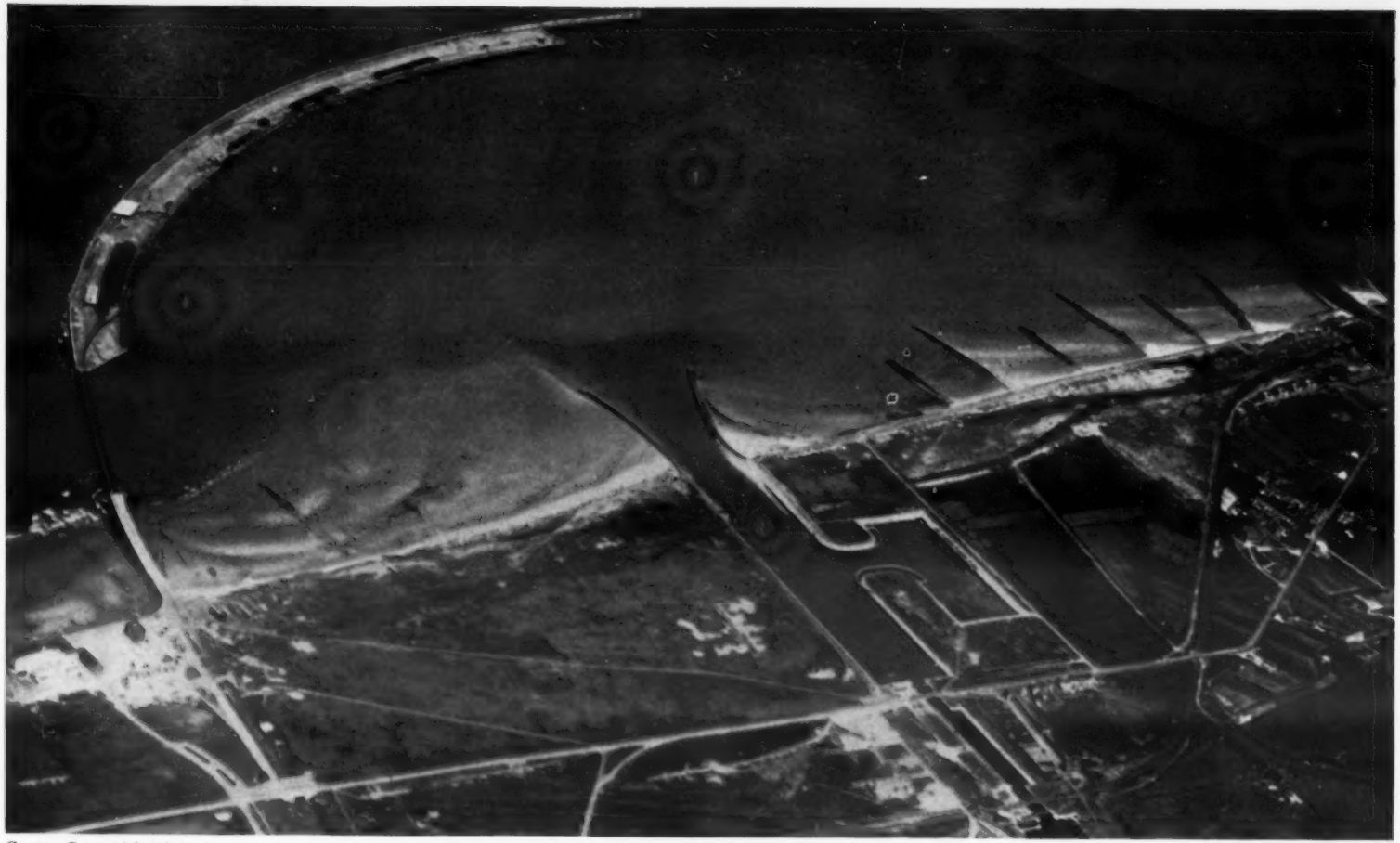


Painting by Charles R. Patterson

A "BLACK-BALL" LINER

The North Atlantic passenger ships of less than a century ago.



Courtesy German Admiralty

ZEEBRUGGE

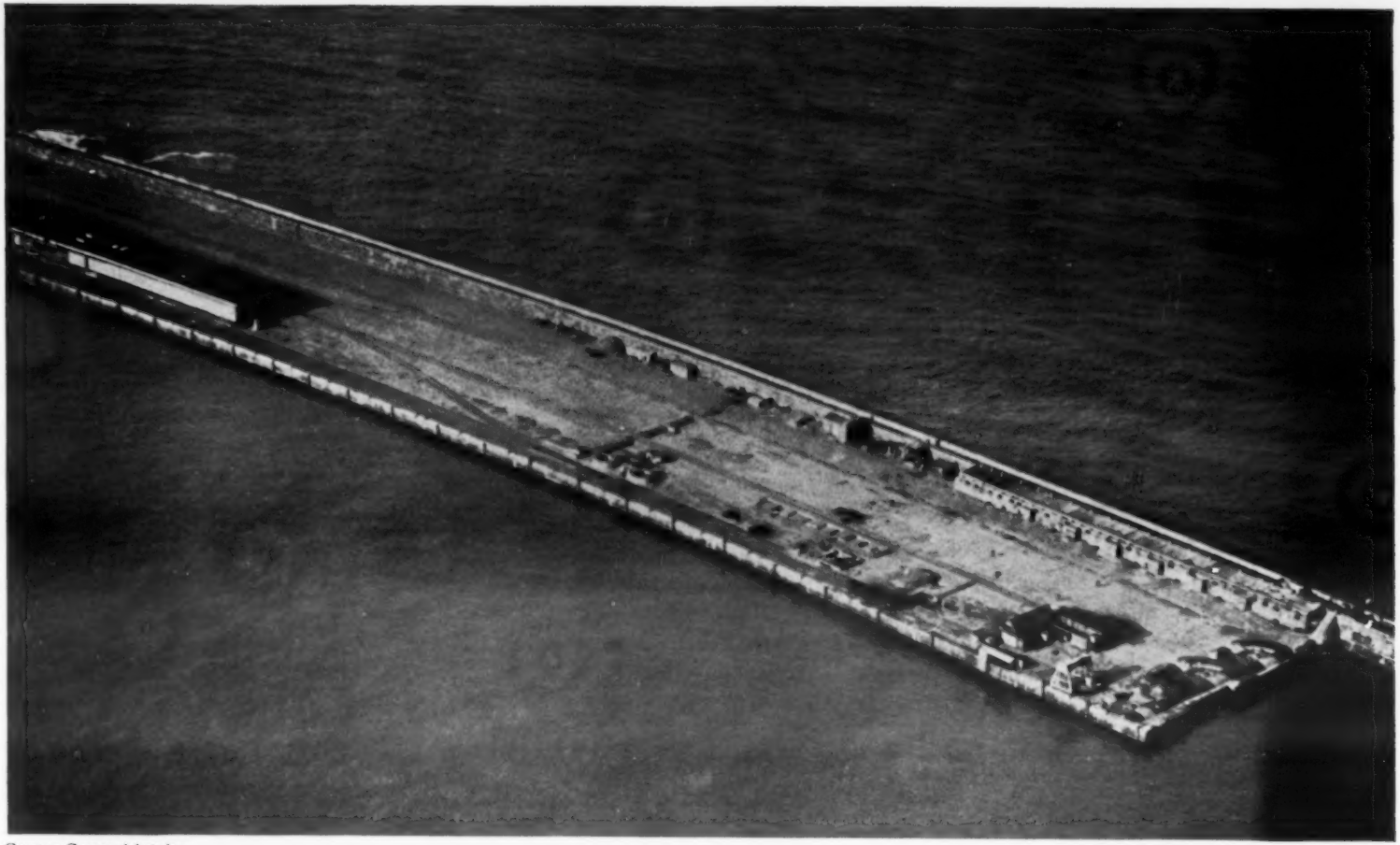
Air photograph showing the mole and entrance to the Bruges Canal.

Courtesy German Admiralty

ZEEBRUGGE
Air photograph showing the mole and entrance to the Bruges Canal.

Courtesy German Admiralty

THE END OF THE MOLE AND MOLE EXTENSION
Viewed from the lighthouse and showing the four inboard guns of the battery.



Courtesy German Admiralty

THE OUTBOARD END OF THE MOLE

Showing No. 3 shed at the left and the fortified zone extending across the mole. The *Vindictive* was to have landed alongside the farther side of the mole at the right.

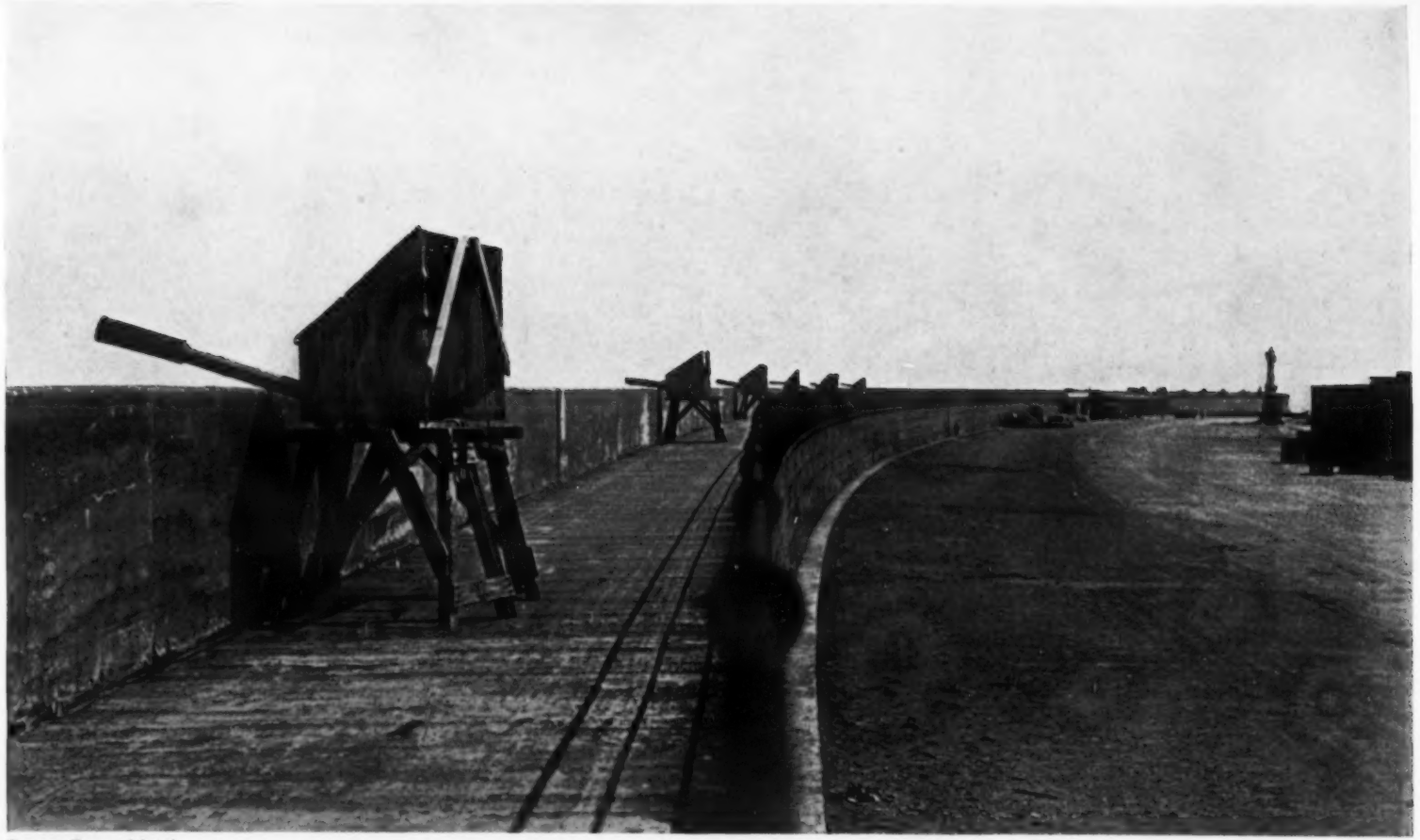
Showing No. 3 shed at the left and the fortified zone extending across the mole. The *Vindictive* was to have landed alongside the farther side of the mole at the right.

Courtesy German Admiralty

THE MOLE EXTENSION, ZEEBRUGGE
Looking toward the lighthouse and showing six guns of the battery.

Courtesy German Admiralty

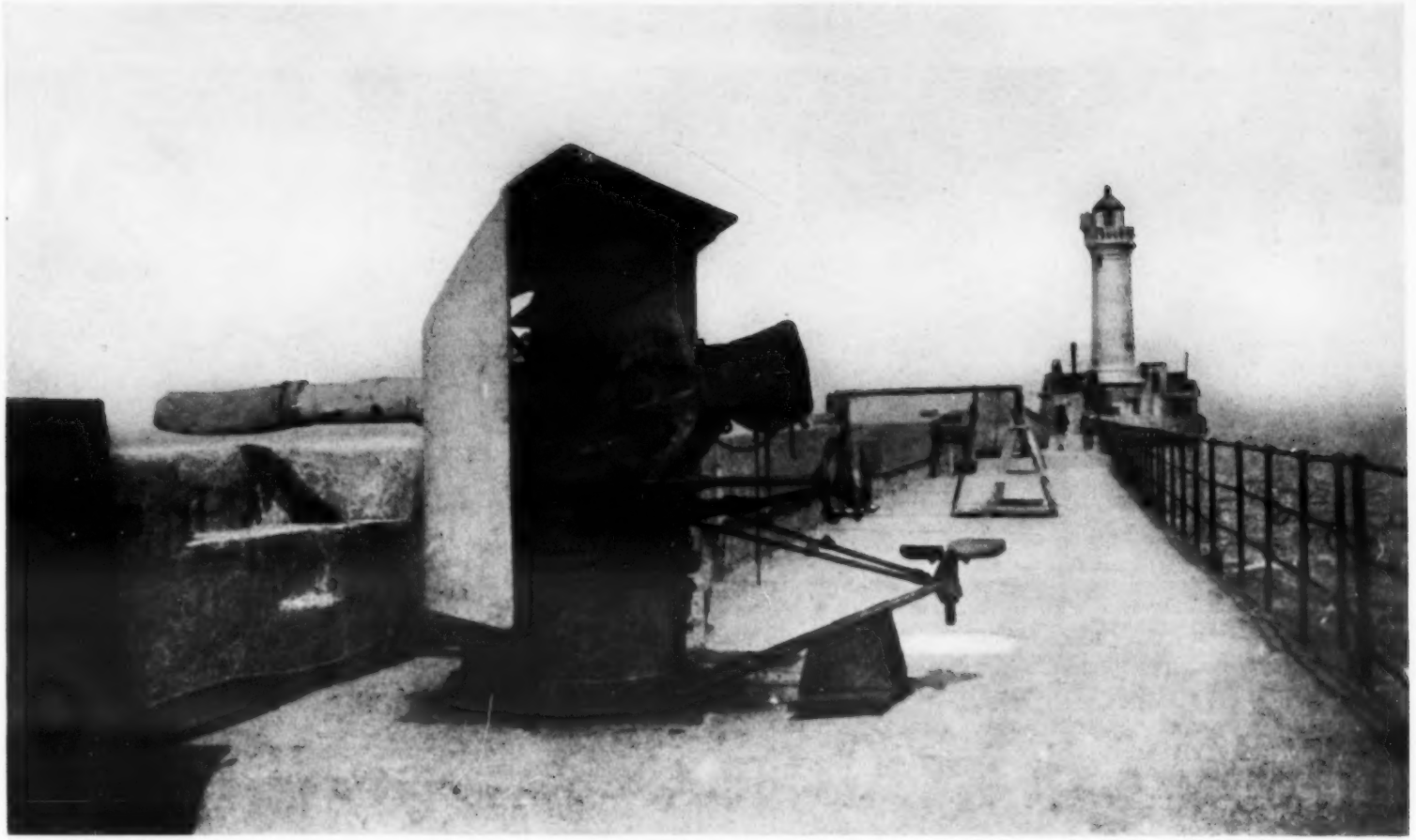
THE END OF THE MOLE AND MOLE EXTENSION
Looking toward the lighthouse.



Courtesy German Admiralty

THE MOLE AND PARAPET

Looking from a position between Nos. 2 and 3 sheds toward the lighthouse. In the foreground is a dummy battery. On the right is No. 3 shed, opposite which the *Vindictive* landed.



Courtesy German Admiralty

A GUN ON THE MOLE EXTENSION
Showing its lack of depression due to the bulwark against which it is mounted.

A GUN ON THE MOLE EXTENSION
Showing its lack of depression due to the bulwark against which it is mounted.

Courtesy Navy Department

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GERMAN SUBMARINE *U*-103 SHOWN IN SINKING CONDITION IMMEDIATELY AFTER HAVING BEEN RAMMED BY H.M.S. *OLYMPIC* OFF THE SOUTH COAST OF IRELAND, 3:50 A.M. MAY 12, 1918. THE U.S. DESTROYER *DAVIS* COMMANDED BY COMMANDER W. V. TOMB, U.S. NAVY, RESCUED THIRTY-FIVE OF CREW; NINE PERISHED. THIS PAINTING WAS MADE BY POINTER, Q. M. 3c, OF THE U.S.S. *DAVIS*.

Painting by T. Buttersworth (about 1808). Copyrighted; publication prohibited

THE BOMBARDMENT OF COPENHAGEN IN 1807

It is believed that this is the first time this painting has been copied or reproduced. The owner, Captain Bertun, states, "The photo is good and the details of the ships show fairly well, but the beautiful color effect of the original must be seen to be appreciated. I think the painting is historically correct—even the thunderstorm of the night bombardment is shown."

THE BOMBARDMENT OF COPENHAGEN IN 1807

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UNITED STATES
NAVAL INSTITUTE
PROCEEDINGS

Vol. No. 55, No. 3 MARCH, 1929 *Whole No. 313*

The Attack *on* Zeebrugge

By LIEUTENANT COMMANDER H. H. FROST, *U. S. Navy**

WHEN Elizabeth reigned there was not a fortified city in England. But all England was a castle. Around its walls Providence had set a mighty moat. On this moat a fleet kept watch—such was England's defense.

Before the days when this invincible fleet began its watch the moat had been an easy road to England—not an obstacle. Julius Cæsar marched his legions along it. Saxon, Dane, and Norse sea-kings used it as their highway. William and his Norman knights found it to their liking. But after the Royal Navy came into being those seas became obstacles instead of roads. For two fateful days the veteran tercios of Alexander of Parma lay in their boats at Nieuport waiting to hear that the Invincible Armada had cleared the way. In their knapsacks were the full-dress uniforms to be used for the entry into London—they had to be used to celebrate some lesser triumph. A century ago the corps and divisions of the Grand Armée were camped in readiness for their long-practiced crossing while a grey-cloaked Emperor watched in vain for Villeneuve and Gravina with their combined fleets.

While these attempts failed—and many lesser ones likewise—Britons for centuries had looked anxiously toward the farther shores of the Narrow Seas. Long had it been a primary national policy to keep from those shores a strong sea power. Even Bloody Mary had said that Calais would be found written on her heart. Thus, as the World War broke over Europe, Britain again looked across the Narrow Seas with anxious eyes. France was an ally, Holland a neutral; so Belgium wished to be, but could not. British statesmen recognized their danger. The Admiralty strove to stem the rising Germanic tide.

As early as August 26, General Ashton, with a brigade of 3,000 marines, came to Ostend. "You will establish yourself at Ostend," his orders read, "forming an entrenched picket line around the town in such a way as to enable you to cover the debarkation of a Division of the Army."

"In order to discharge adequately the responsibilities which we have assumed for the aërial defense of England," wrote Churchill on September 5, "it is necessary that we should maintain an aërial control over the area approximately one hundred miles radius from Dunkirk." A force of aircraft and motor trucks was placed there.

Two days earlier the first lord had invited attention to another danger, the basing of German submarines on the channel ports. On September 16 he augmented the French garrison at Dunkirk with another brigade of marines. At Antwerp he gambled for the channel ports and the Belgian coast. The former were saved; the latter lost. Antwerp fell before von Beseler and his battery of 42-centimeter guns on October 9; four days later the Germans marched into Ostend. "From either the naval or the military point of view," predicted the *Times* of October 17, "the German occupation of

* The writer desires to express his appreciation to the German Admiralty for furnishing the photographs of Zeebrugge and the mole which accompany this article.

Ostend is of no more account than the German band which played in the square at Bruges on Thursday night." This was whistling to keep up courage.

The Kaiser entrusted the Belgian coast to his navy. The Flanders Naval Corps, under Admiral von Schroder, was formed to hold the battle line of twenty-eight miles of low-lying, sandy shore which extended from the trench systems of Nieuport to the Dutch frontier at Sluis. It was indented by two man-made seaports: Ostend, distant ten miles from the front; Zeebrugge seven from Holland. Bruges lay inland—from Zeebrugge, eight miles; from Ostend, eleven. With the former it was connected by a ship canal 25 feet deep and 230 wide; smaller canals ran to Ostend.

Along the coast powerful batteries sprang up. By April, 1918, the guns were 225; 136 of them of 6-inch or greater caliber. One battery of 15-inch were ranged to 42,000 yards.

In October, 1914, preparations for a submarine base began. The boats were shipped in sections by rail to Antwerp; there they were assembled and towed through canals to Ostend and Zeebrugge; before the end of the year they were off the English coast. On March 29, 1915, the Flanders Submarine Base was formally established. Captain Bartenbach proved an able and energetic commander. His submarines were of two classes: UB-boats, which fired torpedoes; UC-boats, which laid mines. In July UB-boats began to pass through the Dover Straits and attack the crowded shipping in the English Channel. Next month UC-boats commenced their mine-laying off French ports. By October, sixteen submarines were in commission. Well they did their work. Admiral Scheer says that during the war they accounted for twenty-three per cent of the Allied shipping losses, not counting vessels sunk by mines. During the summer months of 1916, when torpedo warfare was prohibited, Flanders UC-boats sank 70,000 tons of ships in this manner.

To guard the submarine bases against air attack the Germans consistently maintained control of the air over the lower part of the North Sea, basing their planes mostly on Zeebrugge mole. Their antiaircraft batteries were effective in forcing Allied planes to increasing altitudes.

To assist submarines in reaching their cruising grounds, a force of torpedo boats, mine sweepers, and patrol vessels was built up in Flanders; a half-flotilla of five destroyers supported it. Late in 1916 two full flotillas arrived from the fleet. Commodore Michelsen, with this detachment, commenced a series of raids on the Dover barrage and English and French coastal towns. As a result Jellicoe says that "a great deal of ill-informed criticism was leveled at the Admiralty and the Vice-Admiral commanding at Dover." In order not to expose the destroyers to bombardment and air attack they were sent up to Bruges between attacks. It took two and a half hours to get four boats through the Zeebrugge locks.

The British, realizing that the Flanders bases would prove a thorn in their side, used every conceivable form of counterattack. A campaign much like trench warfare was waged with almost daily contacts. Air attacks, bombardment by monitors, and offensive mining became routine, but had small effect. Landing and blocking attacks were considered and planned, but the difficulties were always found insuperable, as probably they were. Up to April, 1918, Bruges and Zeebrugge were intact; Ostend had been rendered untenable, but still provided an exit to the sea from the main base at Bruges.

Besides these attacks on the Flanders bases, other measures were taken to curb the activities of the German submarines and destroyers once they reached the sea. Chief among these was the Dover barrage. Every effort to block the straits was ineffective until December, 1917. But then a barrage of 4,000 mines, illuminated at night by anchored patrol craft, dealt, as Michelsen admits, a "severe blow to the Flanders Flotilla." In February the High Sea Fleet submarines ceased passing through the Dover Straits. Submarine losses rose to eight monthly and Michelsen says that "they might have been diminished, in all probability, had we promptly abandoned the bases in Flanders after the English had succeeded in barricading the Straits of Dover, since the Flanders Flotilla bore more than half the losses."

Against the destroyer raids the British concentrated at Dover a large force of destroyers and leaders. On the night of April 20, 1917, the leaders *Broke* and *Swift* sank two German destroyers by ramming and torpedoes. This checked the German flotillas for nearly a year. It was not until Feb-

ruary 15, 1918, that they again attacked the Dover barrage; a tactical success which had no permanent effect.

Late in 1917, plans for blocking the exits from Bruges again were considered. Admiral Bacon, commanding the Dover Patrol, developed a scheme for monitors to land parties on the Zeebrugge mole and to destroy the lock gates with their turret guns. Sir Roger Keyes, director of the plans division of the Admiralty, had a different idea —to use blockships. On December 18, 1917, Jellicoe approved Bacon's plan and directed him to return on the twenty-ninth to explain it to the other sea lords.

In the interim the Admiralty shake-up occurred. Jellicoe was relieved, Bacon told his plan was disapproved, and the new Admiralty Board came, as Professor Terry says, "to a conclusive decision to put the scheme of the plans division into execution." Keyes, as acting vice admiral, relieved Bacon in command of the Dover Patrol on New Year's Day.

The mission assigned to the new commander was to block the canals leading from Bruges to both Zeebrugge and Ostend. This would eliminate Bruges as a base and confine all vessels there when the attack was made.

The main attack was to be launched against Zeebrugge. Here an immense concrete mole seventy-five yards wide covered the approaches to the canal. It commenced near the shore and ran out crescent-like for 1,700 yards. An iron bridgework viaduct, supporting railroad tracks, connected the inboard end of the mole with the shore. From the outboard end of the mole a stone extension, five yards wide, ran out for an additional three hundred yards, having at its extreme end a lighthouse. Along the seaward edge of the mole was a parapet eight feet wide and raised fourteen feet above the floor of the mole. The mole extension was a widened continuation of this parapet and at the same level. Along the outer edge of the parapet and the mole extension ran a continuous bulwark three feet high and two feet wide. According to information furnished by the German Admiralty there were on the mole extension four 10.5-centimeter (4.1-inch) and two 8.8-centimeter (3.5-inch) naval guns. They were mounted close behind the bulwark at intervals of about twenty-five meters. They could fire through an arc of 360 degrees except in so far as they masked each other. Loading would be somewhat difficult when trained inside the harbor. When pointed outside the harbor the bulwark prevented the guns from being depressed more than a few degrees—this would not allow them to be pointed at the waterline of vessels close at hand. Ammunition was kept in readiness at the guns. A 15-centimeter Very cannon was mounted on the mole.

Almost the only advantage on the side of the attackers would be that of surprise. To gain this the attack must be made at night. To reduce the effectiveness of enemy gunfire a smoke screen was essential. The blockships would have to come under the point-blank fire of the mole battery in a sector which might not be covered by the smoke screen. It was therefore decided to land on the mole and storm its battery before the blockships would come under its fire. To prevent reënforcements from reaching the mole the viaduct connecting it with the shore was to be destroyed. To prevent the destroyers and torpedo boats secured to the inner side of the mole from firing on the blockships, they were to be attacked by the landing party from the mole, while coastal motor boats torpedoed them from inside the harbor. Long-range bombardment by monitors and bombing attacks by aircraft were to add to the pleasures of the occasion and distract the attention of the Germans from the main attack. Such, in brief, was the plan for Zeebrugge; the scheme for Ostend was similar, except that there was no mole to be attacked.

History did not record the success of a single blocking attack; even with the best laid plans it must have been doubtful whether this one would effect any material result. We think that there was another idea, another purpose in making such a bold, almost reckless, attack. An old letter by Wolfe gives us the key. "In particular circumstances and times," he wrote, "the loss of a thousand men is rather an advantage to a nation than otherwise, seeing that gallant attempts raise its reputation, whereas the contrary appearances sink the credit of a country, ruin the troops, and create infinite uneasiness and discontent at home." Thus we conceive that the real primary mission of the enterprise was to revive the morale of the British Empire. This idea must have predominated more and more after the ter-

rible defeats of March and April. Visualize the situation which existed in April, 1918. Had not there occurred one of those combinations of "particular circumstances and times" of which Wolfe had written?

As soon as Sir Roger Keyes hoisted his flag, preparations began. Five old cruisers of 3,600 tons were fitted for blockships at Chatham dockyard. Concrete was poured in for ballast; explosive charges were strung from bow to stern; smoke-producing apparatus was installed; four 6-inch guns were retained; the masts were removed. On April 4 they went to the West Swin anchorage.

The old cruiser *Vindictive* was prepared at Chatham to storm the mole. Three, possibly four, 6-inch guns were left on the port broadside. One 7.5-inch howitzer was mounted on the forecastle and another on the port side amidships; on the quarterdeck was an 11-inch howitzer. Twelve Stokes mortars, five pompoms, and many machine guns were mounted on the forecastle and upper deck or nested in the foretop. Flame throwers were installed on the bridge and aft. Except for the lower part of the foremast all masts were removed. Fenders were placed over the port side. Two anchors were made ready for letting go. Grapnels to throw over the parapet of the mole were provided. Along the port side a wooden superstructure deck was built; from its outboard edge were pivoted eighteen brows or gangways, about two feet wide, to be dropped on the mole. In the stern was gear for throwing rockets to light up the harbor entrance.

Two Liverpool ferry boats, the *Iris* and *Daffodil*, were prepared at Portsmouth. They were of shallow draft, were easily maneuvered, had considerable power, and because of their double hulls were almost unsinkable. Each could carry 1,500 men. They were to carry a part of the storming party. If necessary they could move or hold the *Vindictive* along the mole and, if she sank, save her survivors. Early in April the *Vindictive*, *Iris*, and *Daffodil* joined the blockships in the Swin.

It was necessary to develop a smoke-producing apparatus which did not give off flame. Wing Commander Brock did this and installed it on motor launches and coastal motor boats at Dover.

To destroy the viaduct two submarines were loaded with explosive, to which were attached fuses designed to burn five minutes. Gyro-steering control was fitted to keep the boat on a straight course after the crew left. Two motor skiffs and a scaling ladder were to be used for escape. Thus these submarines were a combination of the famous Antwerp "hell-burners" and modern torpedoes.

The 61st and 65th wings of the Royal Air Force took photographs of the objectives under all conditions of tide, and prepared for their bombing attack.

Volunteers from the Grand Fleet and shore stations assembled at Chatham in February. A reproduction of the Zeebrugge mole was used for daily rehearsals of the landing. After the ships reached the Swin all communication with shore ceased.

Obstructions were removed from the route toward the objectives of the attack, and special buoys established. Marks were laid down to show the assigned positions of the bombarding monitors.

It was necessary that the attack be made about midnight. This would allow five hours of darkness for the force to approach undetected by the enemy and four hours and forty minutes to complete the attack and get clear before day broke. It must be high tide, too, for the blockships to get into the canal, to enable the *Vindictive* to run aboard the mole, and to reduce the danger from mines. High tide came at midnight on the eleventh and twenty-second of April. Because of the 100-mile run for the small craft and the difficulty in coming alongside the mole, a calm sea also was essential. For the smoke screens to blow toward the land the wind had to be from seaward. There must be no fog but low visibility was desirable. It could scarcely be expected that all conditions would be favorable.

On April 4 all was in readiness. On April 11 the first attempt was made, but a change of wind when only thirteen miles from the objectives forced a return to port. Two days later a second attempt was abandoned after being under way less than three hours.

On April 22 the third attempt was made. Before commencing its description it will prove interesting to hear how Wolfe thought such an attack should be conducted. "I have found," he wrote to Major Rickson after the failure of the Rochefort Expedition, "that an Admiral should endeavor to run into an enemy's port immediately after

FIGURE 1.
The Dover–Zeebrugge Area and the Approach of the Attacking Forces.
H.H.F.
Sea Miles
0
10
20
30
40
= Shipwash
= Outer Gabbard
= Sunk
= Galloper
Orfordness
Harwich
Colchester
Kindelire & Blackships
1.10. = West Swin
North Hinder
8.45
9.55–10.30
Goodwin Sands
Rendezvous
4.53
Margate
Ramsgate
Deal
Canterbury
Dover
2.00 Dover Patrol
Dunkirk Force
Dunkirk
Calais
Gravelines
Nieuport
Ostend
Bruges
Zeebrugge
Holland
Sluis
Scheldt River
Flushing
Walcheren
Ghent
Battle Front
Thames River
Chatham
Maldon
Dungeness

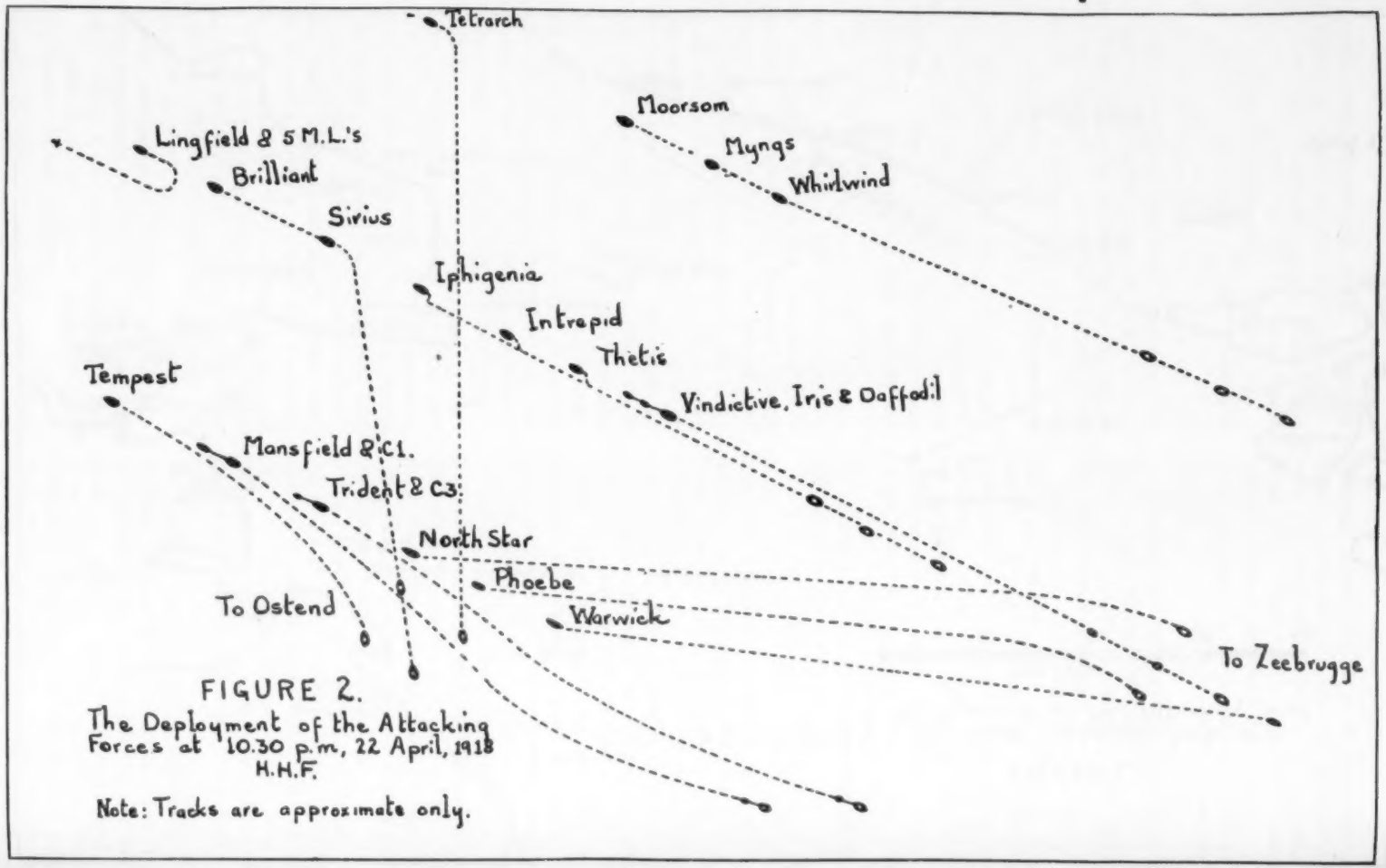
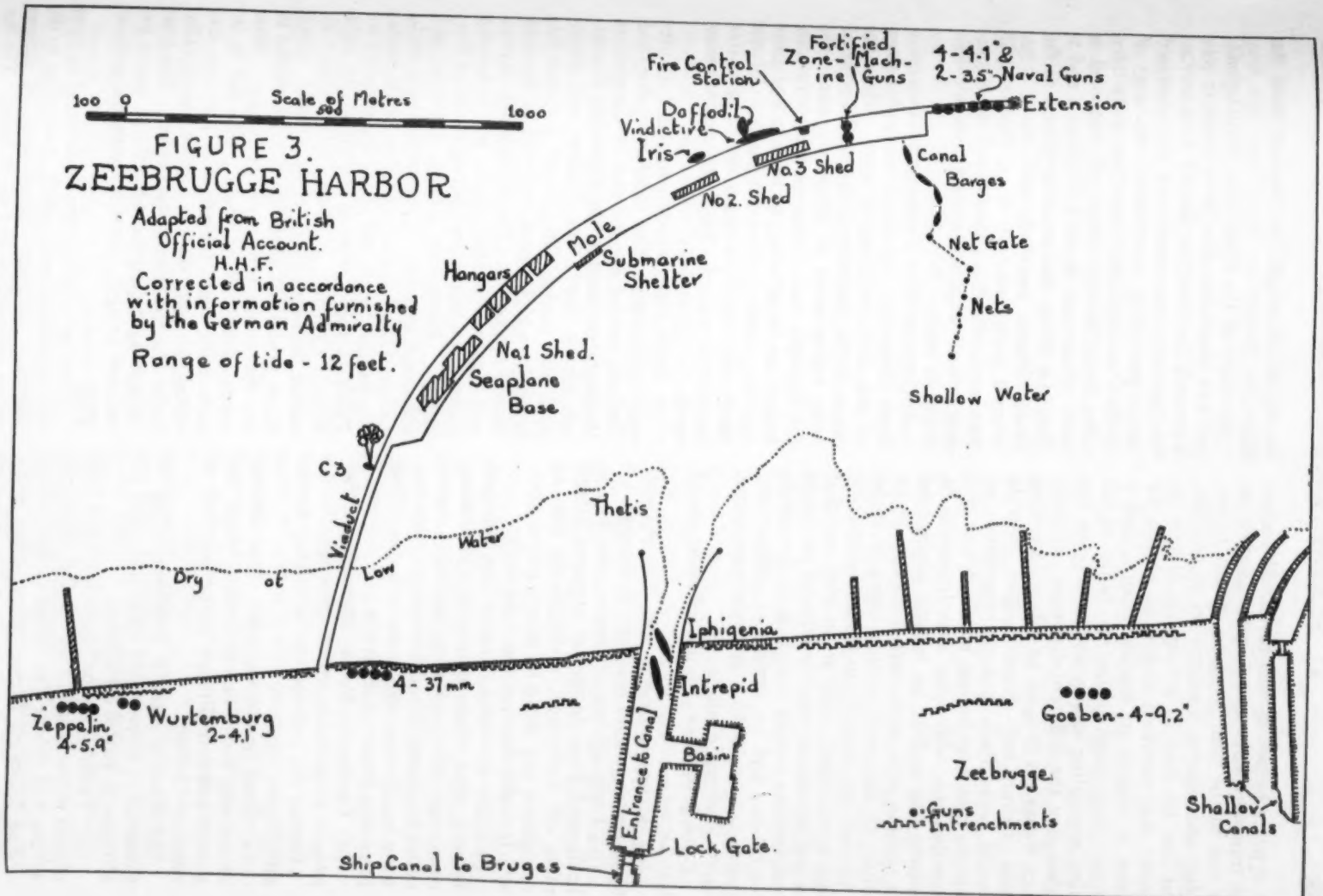


FIGURE 2.

The Deployment of the Attacking Forces at 10.30 p.m, 22 April, 1918

H.H.F.

Note: Tracks are approximate only.


100 0 Scale of Metres 500 1000
FIGURE 3.
ZEEBRUGGE HARBOR
Adapted from British Official Account.
H.H.F.
Corrected in accordance with information furnished by the German Admiralty
Range of tide - 12 feet.
Fire Control Station
Fortified Zone-ine
Mach-Guns
4-4.1" & 2-3.5" Naval Guns
Extension
Daffodil
Vindictive
Iris
No 3 Shed
No 2. Shed
Canal
Barges
Net Gate
Nets
Shallow Water
Hangars
Mole
Submarine Shelter
No 1 Shed.
Seaplane Base
C3
Viaduct
Thetis
Water
Dry at Low
Iphigenia
Intrepid
4 - 37 mm
Zeppelin 4-5.9"
Wurtemburg 2-4.1"
Goeben - 4-9.2"
Entrance to Canal
Basin
Zeebrugge
Guns
Intrenchments
Shallow Canals
Lock Gate.
Ship Canal to Bruges

he appears before it; that he should anchor the transport ships and frigates as close as he can to the land; that he should reconnoiter and observe it as quickly as possible, and lose no time in getting the troops on shore; that previous directions should be given in respect to landing troops, and a proper disposition made for boats of all sorts, appointing leaders and fit persons for conducting the different divisions. Experience shows me that, in an affair depending upon vigour and dispatch, the generals should settle their plan of operations, so that no time may be lost in idle debate and consultations when the sword should be drawn; that pushing on smartly is the road to success, and more particularly so in an affair of this sort; that nothing is to be reckoned an obstacle to your undertaking that is not found really so on trial; and that in war something must be allowed to chance and fortune, seeing that it is in its nature hazardous, and an option of difficulties." Every one of Wolfe's precepts was obeyed in the Zeebrugge attack.

During the afternoon the following forces left Dover:

(a) Monitors *Erebus* and *Terror,* with three destroyers, to bombard Zeebrugge.

(b) Light cruiser *Attentive,* one flotilla leader and three destroyers to patrol fifteen miles off Zeebrugge, maintain the aids to navigation and drive in enemy patrol craft which might discover the main body.

(c) The *Warwick* (flag of Vice Admiral Keyes), nine other destroyers, two submarines, one mine sweeper, eighteen coastal motor boats and thirty-three motor launches, for a rendezvous off Goodwin Sands. This force left Dover at 2:00 P.M.

(d) Destroyers *Velox, Morris,* and *Melpomene* to patrol north of Zeebrugge.

During the evening the following forces sailed from Dunkirk:

(a) Four monitors, with three British destroyers, five French torpedo boats, six British and four French motor launches, to bombard Ostend.

(b) Flotilla leaders *Faulknor* (flag of Commodore Lynes) and *Swift* and three destroyers to patrol off Ostend.

(c) Twelve motor launches and six coastal motor boats to lay the Ostend smoke screen and rescue the crews of blockships.

The Harwich Force, twenty-three ships, took station off the Dutch coast to intercept forces which might be coming from the High Sea Fleet.

At 1:10 P.M. the *Vindictive, Iris, Daffodil,* and five blockships left West Swin to join Keyes off the Goodwin Sands. At 4:00 P.M. the junction was made and the combined force proceeded northeast. At 4:53 it reached an appointed position sixty-three miles from the objectives and proceeded in three columns as shown in Figures 1 and 2. The 61st Wing and scouting planes of the Dover Patrol escorted until about 7:30, when it grew dark. At 8:45, Position "C" was reached and a prearranged radio message told all ships that the attack would definitely be made.

At 9:55 the force stopped seventeen miles from Zeebrugge, or about two miles short of the *Attentive's* patrol force. Here the crews of the blockships were to be reduced from eighty-seven to fifty-four men. On the *Intrepid* and *Iphigenia* the extra men begged to be allowed to remain and their captains allowed them to do so. All the small craft which had been towed up to this point were cast off. Final preparations were made.

At 10:30 P.M. vessels proceeded as previously directed. The *Vindictive, Iris,* and *Daffodil* headed for the end of the mole at ten knots, escorted by the *Warwick, Phoebe,* and *North Star.* The *Trident* and *Mansfield,* still towing the *C1* and *C3,* and followed by a picket boat, inclined to the right toward the viaduct. The *Whirlwind, Myngs,* and *Moorsom* inclined to the left to join the *Velox* detachment and patrol north of Zeebrugge. Blockships *Thetis, Intrepid,* and *Iphigenia,* escorted by a motor launch each, followed the *Vindictive* at about eight knots. Blockships *Sirius* and *Brilliant,* escorted by *Tempest* and *Tetrarch,* veered to the right toward Ostend. A flotilla of twenty-four motor launches and eight coastal motor boats proceeded ahead of the *Vindictive* to lay the smoke screen off Zeebrugge. Nine other coastal motor boats proceeded to attack with their torpedoes. The sea was calm, the night dark. Silence ruled. Dim hulks blurred against the skyline. The hour of midnight approached. What would the morrow bring? Whither would the paths of glory lead?

How were the Germans disposed to meet the impending onslaught? According to the German Admiralty there were at Brugge seven submarines and six A-boats. The lat-

ter were coastal torpedo boats—displacement 246 tons, length 50 meters, beam 5.3 meters, draft 2.23 meters. In Zeebrugge were seven more A-boats and seven destroyers of the Z-Flotilla. Of these, three destroyers and four A-boats were moored to the inner side of the mole. The eleven remaining submarines of the Flanders Flotilla were at sea. No patrol boats were out. No defensive mine fields had been laid. The British had kept the secret of their attack well. No inkling of it had reached their enemy.

It was a few minutes after the appointed time — 11:20 P.M. — when the monitors opened up. As they had carried through similar bombardments on the two previous nights the Germans thought it merely a routine attack. Unfortunately rain and mist forced the 65th Wing to abandon the scheduled bombing attack. At 11:40 to the minute the thirty-two small craft commenced laying smoke and the gentle northeast breeze blew it in toward the mole. The guns on the mole commenced firing. Unfortunately the wind soon died out and came up again from the southward. The smoke began to roll off. The motor boats and launches gallantly came in again and again to blow out their smoke close to the mole. Destroyers also laid smoke screens and assisted the little fellows with their guns. While the smoke screen did not accomplish all that had been expected of it, still it had done much to confuse and mystify the Germans. They knew now that a large-scale attack was being launched against them—but as to its character they still knew nothing. They would not have long to wait—the next actors were already coming upon the scene.

The storming group approached the mole. The storming party itself consisted of the 4th Battalion, Royal Marines, and a naval battalion. Here is its composition:

4th Battalion, Royal Marines

Company A (Chatham), *Iris*
Company B (Portsmouth), *Vindictive*
Company C (Plymouth), *Vindictive*
Machine Gun Section, *Vindictive,* four Lewis guns; *Iris,* two Vickers guns.
Trench Mortar Section, *Vindictive,* two 7.5-inch howitzers, one 11-inch howitzer, two pompoms, two fixed Stokes mortars; *Iris,* two mobile Stokes mortars.

Naval Battalion

Company A, *Vindictive*
Company B, *Vindictive*
Company C (Demolition Party), *Vindictive* and *Daffodil.*
Company D, *Iris*
Experimental Party, *Vindictive*

At 11:56, the *Vindictive* came through the smoke screen. On her port bow, distant three hundred yards, was the mole extension. "It seemed to those in the ship," says the British press account, "as if the dim coast and the hidden harbor exploded into light. A star-shell soared aloft, then a score of star-shells; the wavering beams of the searchlights swung round and settled to a glare; the wild fire of gun flashes leapt against the sky; strings of luminous green beads shot aloft, hung, and sank; and the darkness of the night was supplanted by the nightmare daylight of battle fires. Guns and machine guns along the mole and batteries ashore awoke to life."

The *Vindictive's* 6-inch guns answer. Full speed is rung. The rudder is put right. The ship approaches the mole at a forty-five degree angle. A hail of shells and bullets sweeps her closely packed decks. Dead fall the captain in command of the storming party and the two senior marine officers. The commander of the naval battalion is severely wounded.

One minute past midnight the *Vindictive* bumps her fenders against the mole. Down goes her starboard anchor to hold her against the 3-knot tide which sweeps from the westward along its face. The port anchor splashes under foot. The ship pounds heavily against the underwater foundation of the mole as she rolls in the long swell. But now the *Daffodil* comes up. At 12:04 A.M. she puts her nose against the cruiser's side and pushes her in bodily. The forward mole grapnel is thrown to the parapet but breaks away. Already many of the landing brows are wrecked by gunfire; others smash up against the mole. But the two forward ones reach the wall. Over them pour bluejackets and marines under heavy machine-gun fire. First they secure another grapnel to the parapet. Then they repair and lower down two more brows. Marines in the foretop cover the advance of the assaulting party; there Sergeant Finch, machine gunner, earns his V.C. Stokes mortars lay down their barrage on the mole. Two en-

tire crews of the forward howitzer are killed; the midship gun is out of action; but the 11-inch fellow on the quarterdeck fires at the lock-gates and shore batteries. Rockets fired out of the stern cabin light the entrance to the blockships.

The *Iris* had gone alongside the mole forward of the *Vindictive*. She had no luck. The grapnels were carried away and scaling ladders smashed. The few men who reached the parapet were killed. Later she tried to come alongside the *Vindictive*, but by this time the signal for retirement had been made. One shell alone killed forty-nine marines and wounded seven. Due to her failure over one-fourth the storming party could not reach the mole.

The *Daffodil* had to hold the *Vindictive* against the mole all through the attack. Her demolition party did not reach the mole; casualties on board were one killed and eight wounded.

About two hundred yards in from the end of the mole was a defensive zone. It had been planned to land the *Vindictive* at the extreme end of the mole beyond this zone. The naval battalion was to over-run the batteries; the marines to turn right, storm the fortified zone and capture the entire mole, including the seaplane base. "Officers commanding units," their attack order ran, "are to imbue their commands with the idea of carrying the operation through with the bayonet; rifle fire, machine-gun fire, and bomb throwing are only to be resorted to when necessary to break down enemy resistance." Wolfe would have liked this!

But instead of securing alongside the end of the mole the *Vindictive* had gone down it four hundred yards. Three eighths of the storming party on the ferry boats had failed to land. All the senior officers were killed. Thus the storming party faced an almost impossible situation from the start. They had but one resource—courage. Often this had sufficed for Britons to win. Would it now?

As Naval Companies A and B reached the mole, already greatly reduced in number, an entirely unfamiliar scene met their eyes. This situation was different from the one they had been trained to meet and their long training now served rather to confuse than to assist their attack. The attackers found themselves on a parapet eight feet wide. On its outer side was the 3-foot bulwark over which they had vaulted; along its inner edge ran an iron railing guarding a 14-foot drop to the mole itself.

Lieutenant Commander Adams led the two companies to the left along the parapet toward the end of the mole. He occupied a lookout station without resistance and continued on along the parapet for forty yards. Then a machine gun in the fortified zone opened up and he had to halt. Three men went down a ladder to the mole and drove off a few of the enemy. Thus ended the first wave of the attack.

Along the inner side of the mole were lying seven destroyers and torpedo boats. Their crews were sleeping in barracks on the mole. Having no weapons these men made little resistance. The few men on watch aboard ship, assisted by their officers, manned their guns and fired on the landing party and the upper works of the *Vindictive*. On one ship a number of officers had gathered for a party; they now manned one of the guns and fired with great execution. On the *Vindictive* the crews of the forecastle Stokes mortars were wiped out and the foretop silenced. She was almost out of action.

Adams, badly wounded, went back along the parapet to get reënforcements; two machine gunners and a few men were all he could find. Then he met Lieutenant Commander Harrison, the battalion commander. Although knocked unconscious by a shell before reaching the mole, he had hurried ashore as soon as he regained his senses. Directing Adams to look for reënforcements, he ran along the parapet and assumed command of the men near the lookout tower. Then he died a hero's death, gallantly leading a charge. Able Seaman McKenzie did some fine machine gunning and won the V.C. Adams at length arrived with marines, but the machine-gun fire was heavier than ever and his advance was checked. Now the recall was heard and there was nothing to do but collect the wounded and return to the ship. This was done in perfect order.

As the marines scaled the parapet they were confronted with a most confusing situation. The fortified zone was now to the left and not the right. If they attacked it, they would likely have their retreat cut by Germans coming from the right. On the other hand, should they go right the blue-

jackets would not be strong enough to storm the zone and get to the batteries. Major Weller, correctly, we think, decided to go to the right.

The 5th Platoon, about forty-five strong, was the first to reach the parapet. It went to the right along the parapet, silenced riflemen near No. 2 shed, and held a position two hundred yards ahead of the ship. It covered the advance of the other platoons. The 9th and 10th Platoons slid down ropes to the mole and took station at the shore end of No. 3 shed. They attacked a destroyer alongside the mole between the sheds.

The 7th Platoon ran down scaling ladders to the mole and reënforced the 9th and 10th Platoons. Major Weller, at Adams' request, sent the 11th and 12th Platoons to the left along the parapet; machine-gun fire checked them at the lookout station. The 7th and 8th Platoons formed on the mole to the left. The 5th Platoon, which had been recalled from its exposed position ahead of the ship, joined them. The combined force advanced toward the fortified zone, but before their attack could be fully developed the recall sounded. It was then 12:50 A.M. The men on the mole suffered heavily in climbing the scaling ladders to the parapet and in crossing the brows to their ship. Fourteen of the rear guard were captured.

Meanwhile Demolition Party No. 2 had been on the mole for fifty-five minutes. A few bombs had been thrown at destroyers, but because of the proximity of the storming parties no enemy equipment could be blown up. The experimental party apparently did nothing with their flame throwers.

In all, about 350 men of the storming party had reached the mole. By 1:05 A.M. the retirement was completed.

The submarines were scheduled to ram the viaduct at 12:15 A.M. The *C1's* towline to the *Mansfield* parted and she did not attack. *C3* cast off from the *Trident* and proceeded under her batteries at nine and a half knots. The picket boat followed. Soon the viaduct was sighted ahead, distant 3,000 yards. The Germans were on the alert. It was a long way to go.

Now star-shells disclose the submarine to watchers ashore. Two searchlights blind her little crew. The Wurtemburg Battery opens up, then strangely ceases fire. This is unexpected good luck for Lieutenant Sandford. No gyro steering gear for him; he wants to be sure of his V.C., and who would not! Like Cushing he drives his boat at full speed crashing into the viaduct piers; in to the conning tower she goes. Fuses are lighted and the little crew shove off in their frail skiff. Now inferno breaks loose again. Rattling machine guns wound three of the six and the end seems near. Then the explosion of their own fireship gives them a respite and cheers on others in the attacking force. "I never saw such a column of flame," writes Captain Carpenter. "It seemed a mile high. The cheer raised by my men in the *Vindictive* when they saw the terrific explosion was one of the finest things I ever heard." Soon the picket boat rescues the six from their bullet-riddled boat.

The explosion severed all connection between the mole and the shore, including telephone lines; prevented reënforcements from being sent to resist the *Vindictive's* attack; and kept the batteries on shore from receiving proper information; thus they mistook the British blockships for their own destroyers.

Promptly at 12:25 A.M., three blockships, escorted by Motor Launches *526*, *110*, and *283*, passed the mole extension. If all three reached the canal the leader was to ram the lock gates and the others to sink themselves in the entrance. If only two reached the canal the attempt to ram the gates was not to be made.

Assisted by the *Vindictive's* rockets, the *Thetis* rounded the end of the mole extension. Her starboard guns opened on the lighthouse as she headed for the southernmost of the barges which barred the channel. The 4.1-inch guns on the mole commenced firing on her. Passing just south of the end barge she ran into a heavy net, which fouled both propellers and stopped the ship. Her captain signaled for the other ships to pass to starboard and they did so. The *Thetis*, still under heavy fire, took the ground three hundred yards from the eastern canal pier. After a time she partially cleared her propellers and backed off. But the best she could do was to reach the end of the western pier and there she was sunk. The crew got off in a cutter to *M.L. 526*, having lost five killed and five wounded. She did not block or even appreciably narrow the entrance of the canal.

The *Intrepid* at first was hit somewhat by shrapnel, but after passing the end of the mole extension only a few guns fired on her. Passing the *Thetis* she reached the canal practically undamaged. It is rather a pity that her captain, Lieutenant Bonham-Carter, did not disobey his orders and ram the lock gates. But, upon reaching the selected place, he went ahead full starboard and backed full port. When his ship made an angle of about fifteen degrees with the canal he fired the explosive charges. Eighty people abandoned ship in three cutters; one was picked up by *M.L.282*, another by a motor launch outside the *Thetis*, and the third by the destroyer *Whirlwind*.

The *Iphigenia*, after receiving two hits from the mole batteries, followed the *Intrepid* past the *Thetis* into the canal. She also was practically undamaged. After some maneuvering, Lieutenant Billyard-Leake exploded his charges with the ship at about a twenty-five degree angle with the canal. His crew received few casualties and was rescued by *M.L.282*. This little craft, after having saved 101 men, stood out of the harbor and met the *Warwick*, flying the vice admiral's flag. "As the motor launch was dangerously overloaded and full of wounded," he reported, "I ordered them to be transferred to the *Warwick*, which it took more than half an hour to do. I was much struck with the gallant bearing of Lieutenant Dean and the survivors of his crew. They were all volunteers, and nearly all had been wounded and several killed." Dean won the Victoria Cross for his heroic performance. *M.L.110* was sunk.

During the attack the destroyers had been supporting the small craft and maintaining the smoke screen. The *North Star* came inside the mole beyond the smoke and was sunk by gunfire. The *Phoebe* most gallantly saved her crew. The nine C.M.B.'s detailed to fire torpedoes at the vessels along the inner side of the mole performed their mission most gallantly, but the material results of their work are doubtful.

At 12:50 A.M. Captain Carpenter ordered the *Daffodil* to sound her siren as the signal to leave the mole. Twenty minutes later—five after the last man had returned on board—the *Vindictive* shoved off and quickly worked up to seventeen knots. Only a few hits were received during the retirement and her heroes exchanged ringing cheers with the *Warwick* as she passed the admiral's flag. The poor little *Iris* was not so lucky. Twelve times was she hit. "At that short range," writes Lieutenant Commander Hilton Young, "the light fabric of the little ship was hulled through and through, flames and smoke spurting from her far side as the shells struck." *M.L. 558* assisted the *Iris* with a smoke screen but even this did not prevent huge losses—77 killed and 205 wounded.

A few comments may now be in order. The attack on the mole, except as a diversion, was a complete failure. Captain Carpenter gained high praise for heroism, but his very excusable error in bringing the ship in four hundred yards out of position had unfortunate results. The second cause of the failure was the great difficulty in landing on the mole and it appears that the measures adopted, particularly for the *Iris*, were inadequate. The heavy losses of the storming party before reaching the mole were a third cause and possibly these might have been reduced had the party remained to a greater degree below decks until ready to land. However, when all is said, we believe that the storming party accomplished as much as could reasonably have been expected. The task was extremely difficult and perfection in execution is an ideal beyond mortal reach.

The destruction of the viaduct by the *C3* was beautifully planned and executed. The curious error of the Germans in ceasing fire contributed towards its success. For Sanford, the breaks were lucky; for Carpenter, unlucky.

Events showed that the plan for the blockships was too rigid; discretion should have been allowed their captains to ram the lock gates. The shore batteries did not fire on the blockships until they entered the canal and could not have borne if the blockships had kept on a little farther. We believe that the *Intrepid* could have rammed the gates and this would definitely have blocked the canal. True, no one expected the ships to reach the canal so little damaged, but the success of the plan depended upon exploiting the enemy's mistakes. The execution of the plan by the blockships was excellent. The motor launches were handled with extraordinary gallantry and ability in rescuing their crews. The smoke screen, through no fault of plan or execution, was

only partly effective; but this does not seem to have affected the blockships adversely.

What had happened at Ostend? At 11:05 P.M. the small craft commenced laying the smoke screen off Stroom Bank light buoy. At 11:20 four monitors commenced the bombardment, in which land batteries near Dunkirk joined. The blockships *Brilliant* and *Sirius*, accompanied by destroyers *Tetrarch* and *Tempest*, headed for the light buoy. They did not sight it at the proper time. Thinking they had made a mistake in navigation they continued on for two minutes. Then they saw the buoy to port—bearing northeast. Changing course, they passed it on the starboard hand at midnight and headed for the supposed position of Ostend. Some ten minutes previously the wind had shifted to SSW and this blew the smoke back off the coast. At 12:15 the ships came through the screen and into the fire of shore batteries. The *Brilliant* saw breakers ahead and hit the ground before she could stop. The *Sirius*, almost sinking and with steering gear shot away, crashed into the *Brilliant's* port quarter. After futile efforts to get the ships off, the explosive charges were fired at 12:30 and the entire crews rescued by motor boats. At daylight it was seen that the Germans had moved the light buoy 2,400 yards from its usual position and that the blockships were that distance east of the entrance. Admiral Bacon criticizes failure to use more accurate methods of navigation, notably the "taut-wire" gear. It seems to us that the Germans had worked a clever *ruse de guerre*.

The casualties for the British were: killed, 176; wounded, 412; missing, 49; total, 637. The Germans lost 8 killed; and 16 wounded; total, 24.

What were the material results of the attack? Two weeks after the action, Sir Roger Keyes, basing his opinion on aircraft observation, stated that "as yet no effective steps seem to have been taken to clear the Zeebrugge entrance to the Bruges ship-canal." The German Admiralty state that no steps were necessary. An official letter to the writer says: "The blocking of the entrance to Zeebrugge failed. Both destroyers and submarines were able to pass through the narrow points on the first day. The submarine war suffered no restriction or delay through the English attack. This attack also had no effect of any kind on the land forces. The enemy failed to attain the desired end." The Admiralty further state that *A-43* and *A-30* passed the blockships on the twenty-fourth and *UB-16* on the twenty-fifth; and finally that a later blocking attack on Ostend by the *Vindictive* also was ineffective—that the Ostend entrance continued to be used. "Zeebrugge, however, was preferred, as it was easier and shorter."

As we look back on the attempt to block Zeebrugge, success seems to have been almost a mathematical impossibility. Assume that the execution was perfect; that the blockships were sunk exactly at high tide; that their bows were grounded on one side of the channel before sinking and their sterns on the other. Assuming that they drew about eighteen feet, would the canal bank slope up at so steep an angle as to prevent the passage of a destroyer of twenty-five feet beam and ten feet draft or that of a submarine of eighteen feet beam and twelve feet draft? It would seem not. Now it is by no means certain that the ships were aground at both sides of the channel when they sank nor that the tide was at its highest level—twelve feet above low water—at that time. In case of necessity vessels passing could reduce their draft temporarily by running with a minimum load of fuel and stores. On certain days the range of tide was as great as fourteen feet and this would give an additional advantage. These facts seem to support the German claims.

Thus from a material point of view the attack had accomplished very little. But the British losses were a cheap price to pay for its immense moral effects. Exploited by world-wide propaganda, the heroism of British seamen and marines in those gloomy days created a tremendous impression in Allied and neutral countries, perhaps even in Germany. As a *beau geste* it was superb. It showed that Britons still knew how to die! It proved that the Royal Navy had reverted to the Nelsonic idea of warfare. That old-time aggressive fighting spirit gave heart to soldier and civilian when hopes fell low. The attack will ever be ranked as one of the most heroic and spectacular exploits in the history of war. As such it was of distinct value to the Allied cause. Hats off to the brave men who volunteered so cheerfully for a hazardous enterprise and carried it through so gallantly!

The Navy's Relation *to* Commercial Shipping

A Proposal to Further Understanding

By O. H. M. McPherson

IN THE wake of the fervor to establish an American merchant marine on a firm basis, Congress passed the Merchant Marine Act of 1928 (Senate 744), authorizing the enrollment of officers and men in the Merchant Marine Naval Reserve. The general intent of this legislation appears to be directed toward dovetailing the merchant marine with the Navy and to further President Coolidge's policy that commercial ships should constitute "a second line of naval defense."

The plans afoot to encourage American seamen in peace and defensive service are predicated on sound thinking, and would result in efficient coördination in the event of an emergency. This coöperation, however, seems unilateral in its application, as the encouragement of commercial shipping by the Navy is not taken into account. The query is raised, "Why doesn't the Navy learn some of the problems confronting merchant shipping, where its own interests are involved?"

As a premise, it must be acknowledged that commercial shipping has peculiar practices and complex customs, together with a distinctive maritime law—all of which are the accumulation of centuries. The sources of this usage are scattered from the Justinian Code to the latest court decisions of the many countries, and, geographically, from the Isle of Rhodes (via the Hanseatic Cities) to Japan. Our own shipping law, like our common law, is derived in general form from the British, and even to this day we are in no small measure influenced by the British admiralty courts' dicta and the rulings of the British Board of Trade. As a heritage, American shipping in its expansion program must consider the established practice and conform with many foreign regulations and time-honored rules in order to keep or obtain overseas trade.

The Navy's interest in all of these commercial complexities, even during times of alleged peace, is more pertinent than would appear to the casual observer. Let us consider unusual conditions like the chaotic situation in several of the Chinese ports and the post-war settlement of affairs at Constantinople. In the Yangtze the Navy has protected American-owned ships so that they may fulfill their cargo commitments, and in South China the Navy has engaged in preventing organized pirates from harassing mercantile vessels. Rear Admiral Bristol, as the administrator and mediator in the Dardenelles, has received earned praise for his aid to merchant services. During the last decade, there have been similar instances of naval coöperation which have been far reaching.

The Navy's part in safety of life and property at sea is a potent factor. While it is patent that the Coast Guard is the duly organized service for such duty, it has the confines that its name implies, and limited equipment. The Navy with its world-wide duty has no limitations of territorial waters and those adjacent to the United States. Even in times of peace, the Navy's contacts with merchantmen have been marked with fortitude and expertness in cases of salvage, stranding, fire, and collision. The specific examples of this service comprise a long list which have been in some cases the subject of compliments from foreign governments and our own nationals. To comprehend the effect of Navy aid in salvage, primary consideration must be given to results accomplished when salvors were not

in proximity or not equipped with adequate apparatus or personnel. As the Navy's services are not compensated, a great saving is made over the assessment that commercial salvors would have made. The successful salvage of a vessel and its cargo reacts to the banking interests who have financed the venture, to the cargo insurers, to those concerned in the freight money (charterers and their underwriters) as well as to the ship owner and his insurance companies. With naval aid in salvage cases, the cargo, vessel, and freight at risk, which are the usual contributing interests in the payment of salvage, are relieved from their proportionate share which they would be obliged to pay commercial salvors. It is of course admitted that it is not the policy of the Navy nor of the Coast Guard to compete with commercial salvage concerns, as that business is always to be encouraged; only in cases of expediency, impending danger, and isolation of the vessel, is the Navy so to serve.

Vessels of the Navy are liable at any time to be in a position to render assistance to merchantmen in cases of shipwreck or of disturbed political conditions. A more thorough knowledge of general commercial shipping, therefore, would enable the naval officers to work more effectively with the merchant marine. There is no doubt that some of the senior officers have gained considerable understanding of shipping. Men like Admiral Benson, Admiral Cone, and Captain Hill have given another governmental agency, the Shipping Board, invaluable assistance. But in general, naval officers can hardly be expected to have an intimate knowledge of merchant shipping, as their commercial contacts are infrequent.

These generalities are the premises for a recommendation that a suitable course of instruction on merchant marine practice be incorporated into the curriculum of the advanced training of naval officers at the United States Naval Academy. The naval authorities are empowered to give the subject consideration, and no Congressional action is necessary. It is granted that the midshipmen's studies are already too onerous to be crammed into a four-year course. With the advent of radio, aviation, Diesel engines, and numerous other inventions, the undergraduate work has become much more complex than a generation ago. It is believed that the midshipmen are too engrossed in elementary tutelage and too immature in years and experience to embrace the proposed course understandingly.

The line-officer's course which has recently been added for postgraduates has excited interest among those eligible for additional study. The officers attending that course are lieutenants and junior lieutenant commanders. These are the men who have given the Navy some years of service and have committed themselves to future years of duty. These are the men who, with their sea experience, have become mature in judgment and able to grasp maritime problems. These are the officers who are the potential commanding and executive officers. It is therefore proposed that the line postgraduate course should contain a comprehensive study of merchant shipping.

Such a course should include the study of commercial paper, which is the backbone of commerce, viz: bills of lading, charter parties, and letters of credit. An understanding of the contract of affreightment and the relation of the ship to its cargo is the basis of commercial shipping. The subjects of ship classification, vessel construction, cargo handling, towage and lighterage are among the fundamentals. Further study should be made in commercial geography, the existing trade routes, the nations serving in various commercial water services, and such related subjects. To supplement the course, lectures should be given by outstanding specialists—a surveyor from the American Bureau to explain classification, a surveyor from the U. S. Salvage Association to describe damage surveys, a practical commercial shipbuilder to tell of that phase, a marine insurance expert to relate the complexities of that business; and most important, an admiralty attorney to expound the subject of nautical legal problems. Some recognized authorities in the many branches of the shipping business would create more interest as lecturers than could be attained from lectures from a text. There is little doubt that men of the desired ability would be willing to journey to Annapolis for such a purpose, from either that world shipping center, New York, or from Washington, where a number of experts are engaged in the Shipping Board and the Department of Commerce.

Through the Naval War College correspondence course, there could be developed a broad method of instruction. Officers with the necessary prerequisites at remote posts and on sea duty would find the study instructive and sufficiently diverting from their regular service to instil interest. Perhaps it would be advisable not to commence the correspondence course until the regular course proposed herein had been underway for a while and adequate data had been gleaned to incorporate in the published forms.

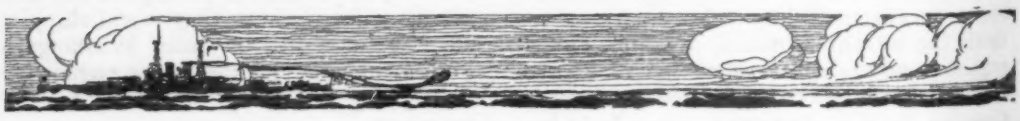
Besides achieving the desired coördination between the Navy and the merchant marine, this course would serve in the interest of those officers who are retired from the service. The Secretary of the Navy's report showed 101 officers retired and 161 resigned in the year 1927. The two previous years indicated that there had been similar severances of commissioned personnel. While it is admitted that many of these officers are retired for age or disability, a number retire on account of age in grade, in the prime of life. Even those officers who retire on account of age or disability often desire to make business connections for economic reasons. The standard of physical unfitness for the Navy is not a criterion for private enterprise. These officers confront the business world with no training suitable to fit them into an appropriate niche.

The merits of the Britten Bill (H.R. 366) are now the topic of comment among naval officers but it is not within the scope of this article to discuss the methods of that retirement legislation. However, the consensus of opinion among those interested in the Navy is that elimination should be effected gradually throughout the various ranks and not from the top grades alone. It is anticipated that this bill will undergo certain changes, but that the general results will be attained regardless of the mutation. This possibility brings out more clearly the situation of the younger retired officers who will be required to seek business associations compatible with their interests.

The statutory limitation of employment has cut down the list of eligible positions at the present time. The strict interpretation of the Act of June 10, 1896 (29 Stat. 361) by the judge advocate general of the Navy, has reduced the interest of naval officers in those commercial activities which are nearest them. It is now hoped that Mr. Britten's other bill (H.R. 5485) repealing the act of 1896 will be passed, thus bringing that latitude in employment for which the retired officers are equipped and to which they are entitled.

With the passage of the promotion system in the bill which Mr. Britten has before the House, the eliminated officers would receive a stipend in accordance with their age and rank and then depart to make a livelihood. It is doubtful whether they return to the states or cities of their birth or appointment to the Academy. The major portion of the younger retired officers will undoubtedly seek associations in the larger cities, and there they must compete with the civilian's experience and training.

The establishment of an adequate course on merchant shipping for naval officers would result in a benefit to the nation as a whole by creating greater efficiency in the coöperation between the Navy and the mercantile marine. The officers in the service would have their interest stimulated, and the resultant understanding of shipping problems would be evidenced both in peace times and in event of war. With their expert background in navigation and knowledge of the sea, naval officers leaving the service after such a course would have qualifications for affiliation with some business related to the sea. Through the retired and resigned officers, the merchant marine would gain those sea-minded men who are vitally needed in maintaining our shipping. It is obvious that one of the Navy's principal functions is the safeguarding of our commerce. Why then cannot some training be imparted to those officers both from the point of view of defense, and of economics?



Courtesy Raymond J. Walker

"THE FENIAN RAM"

Now part of a memorial to John P. Holland erected at Paterson, New Jersey, in honor of the inventor of the first successful submarine.

Courtesy Raymond J. Walker

MEMORIAL TABLET TO JOHN P. HOLLAND

Close-up of the tablet on the memorial shown on previous page. An earlier model of a submarine built by Holland was salvaged a short time ago from the Passaic River, where it had been submerged for over fifty years. This model is now at the Paterson Museum.

International Newsreel

JOHN P. HOLLAND IN HIS SUBMARINE BOAT

Courtesy W. M. Robinson

CONFEDERATE SUBMARINE PRIVATEER *PIONEER*

Note: Stern rudder buried in concrete. Cuff forward probably stuffing box for adjustable air shaft. Propeller blades broken.

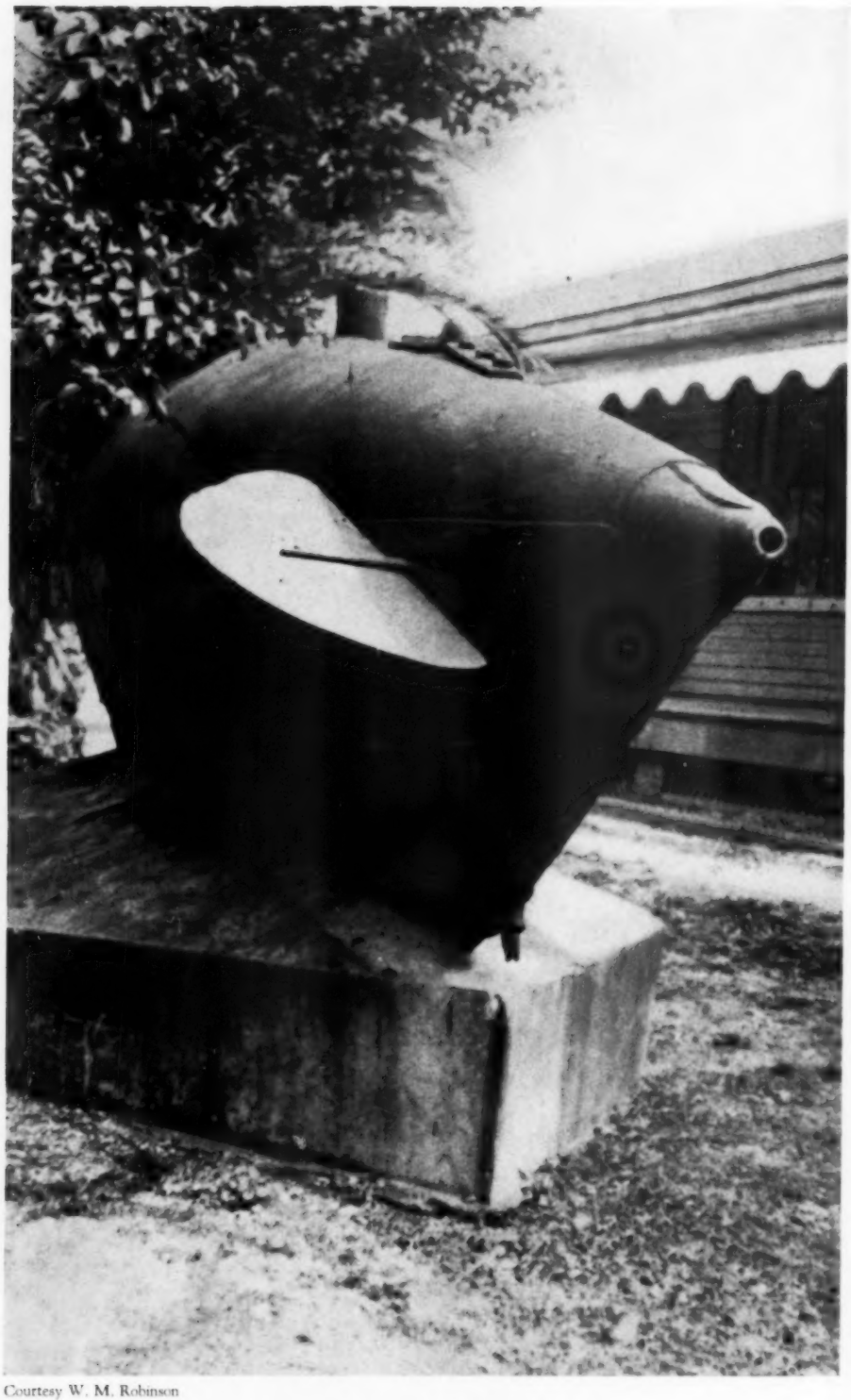
Courtesy W. M. Robinson

SUBMARINE *PIONEER* (STERN VIEW)

The following description is taken from Mr. Robinson's letter: "This vessel was emplaced at Camp Nicholls, Louisiana, the Confederate Soldiers' Home, April 10, 1909, after having lain about forty-seven years in the mud and water. She is exactly twenty feet over all. The maximum inside breadth is three feet two inches and depth about six feet. The machinery is partially despoiled. There were bow and stern equipoise rudders. It is not clear whether the small hole in the prow was for observation or to hold a torpedo spar. I believe more probably the former, and that the torpedo was towed. It is said, in the *New Orleans Picayune* of April 2, 1909, that three men lost their lives in testing her."

Note: Stern rudder buried in concrete. Cuff forward probably stuffing box for adjustable air shaft. Propeller blades broken.

CONFEDERATE SUBMARINE PRIVATEER *PIONEER*



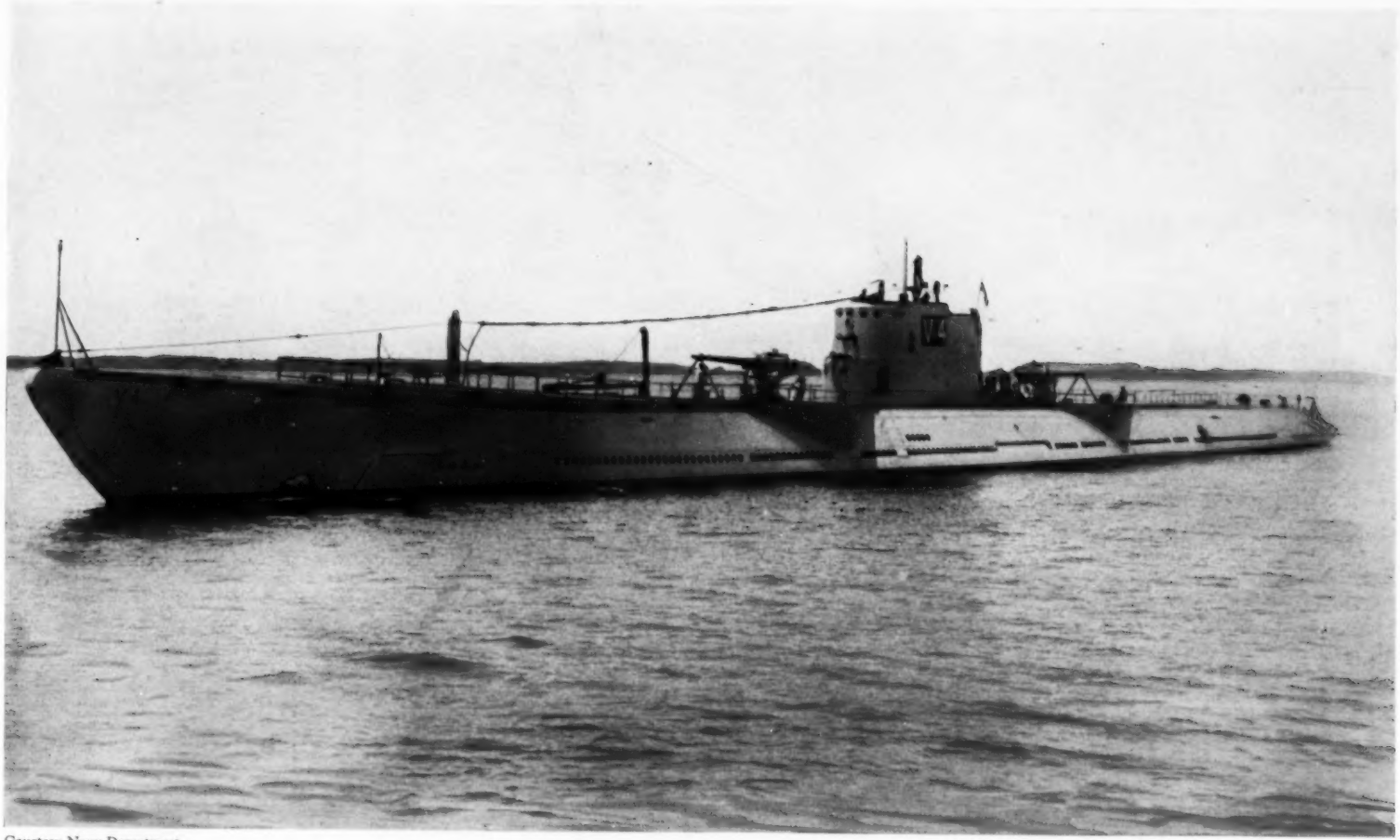
Courtesy W. M. Robinson

SUBMARINE *PIONEER* (STARBOARD BOW)

Although the *Pioneer* failed to accomplish her mission, these photographs are of considerable historical interest, as illustrating early submarine ideas and efforts.

International Newsreel

THE LAST WORD IN SUBMARINES
The *U.S.S. V-4* passing under Brooklyn Bridge on her way to sea.



Courtesy Navy Department

U.S.S. *V-4*

A close-up view of the latest addition to our submarine service. These boats are larger than our destroyers and displace about 3,000 tons.

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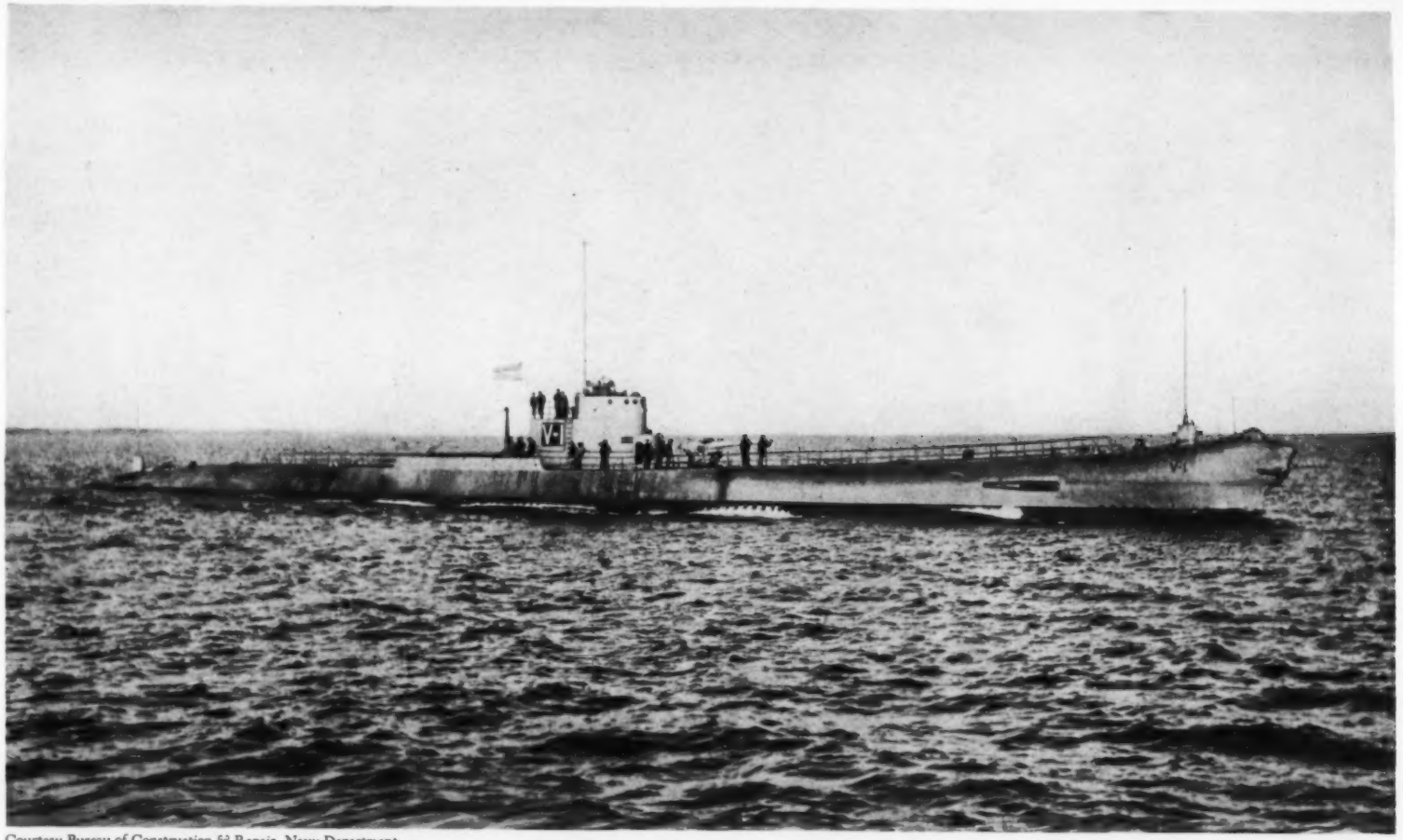


Courtesy Bureau of Construction & Repair, Navy Department

U.S.S. *V-1*

Another of our fleet submarines that has been operating successfully with the fleet. This type of undersea craft provides livable, if not comfortable, quarters for its personnel.

Courtesy Navy Department

SUBMARINE OPERATING AT SEA ON SURFACE RUN

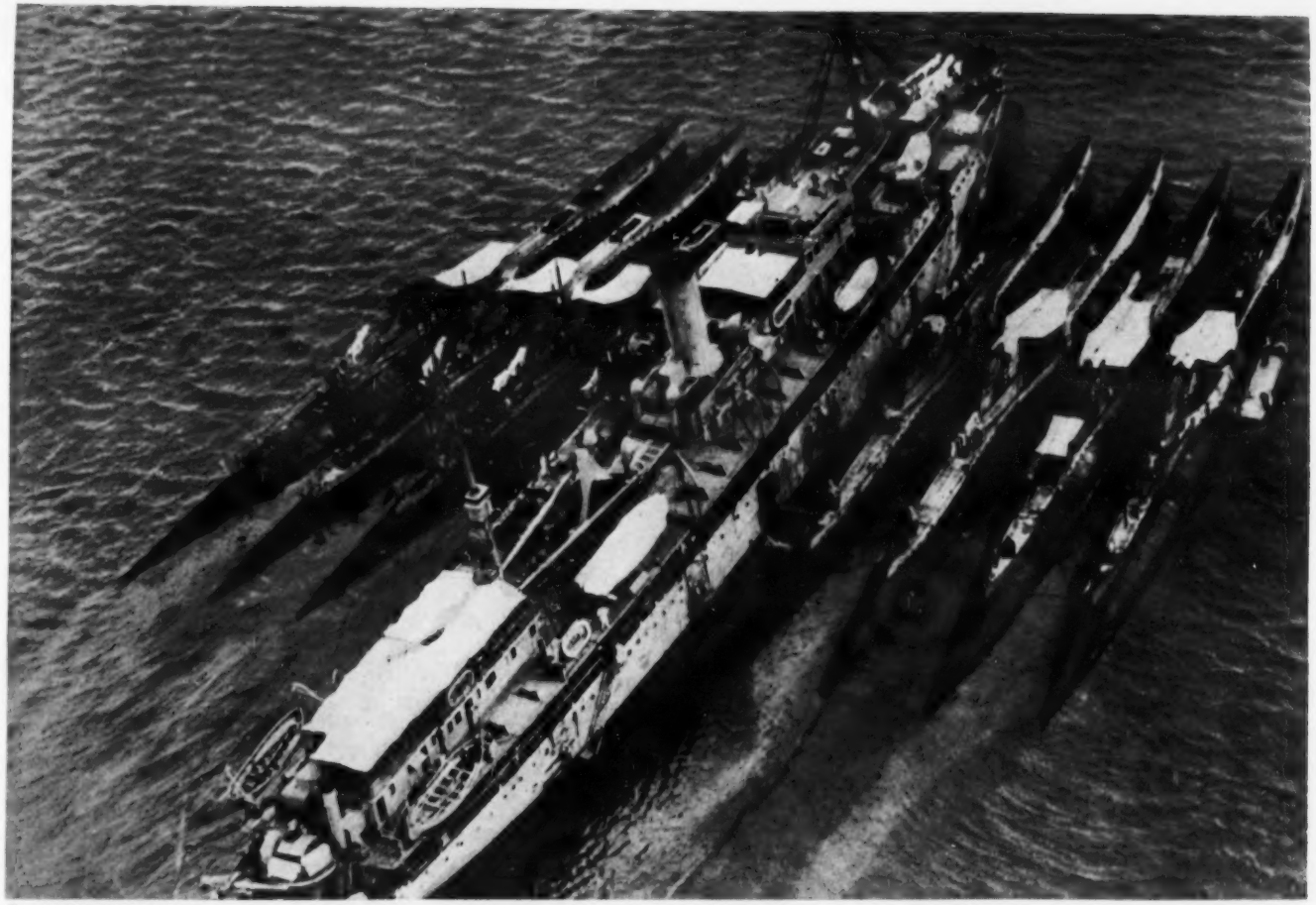
Courtesy Bureau of Construction & Repair, Navy Department

U.S.S. *S-9*
One of our older type submarines.

Courtesy Bureau of Construction & Repair, Navy Department

U.S.S. *BUSHNELL*

Tender for submarines, especially equipped to save the subs and their personnel.



Courtesy Navy Department

U.S.S. *BEAVER*
Mother ship and her brood of submarines in the harbor of Guam.

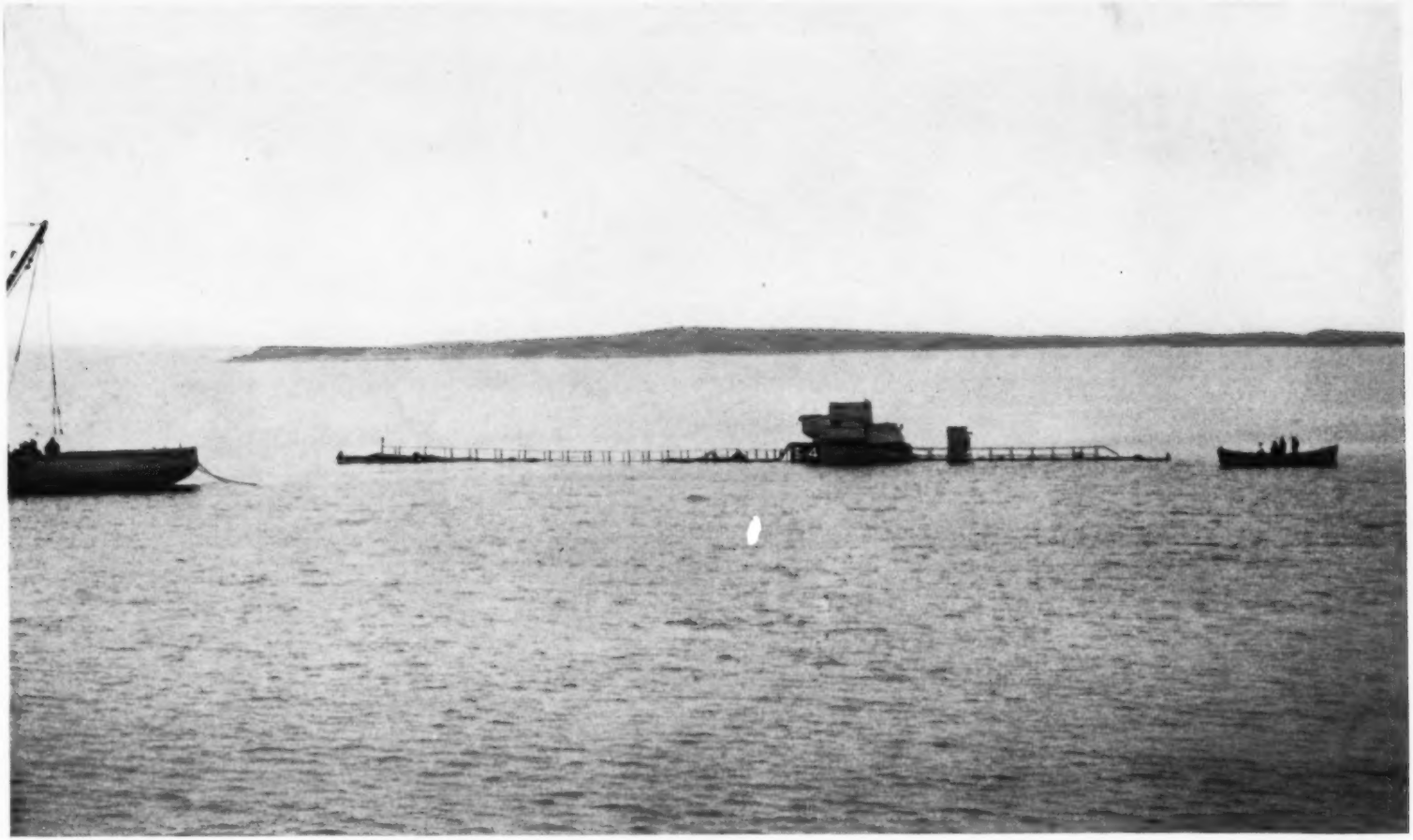
International Newsreel

THE CHIEF OF NAVAL OPERATIONS INSPECTS NEW SUBMARINE RESCUE DEVICE
This device was designed for the purpose of supplying oxygen to persons while ascending from great depths. Divers ascended from depths of 110 feet with no difficulty.

International Newsreel

ANOTHER SUBMARINE RESCUE DEVICE

Owing to the great difficulty of getting aid to the personnel of injured submarines, science has been devoting every effort to solving this most important problem. Illustration shows Simon Lake, one of the pioneers in submarine design, entering the rescue compartment of a newly designed salvage submarine. Tests of this salvage submarine will be conducted to determine its practicability.



International Newsreel

SAFETY TESTS ON RECONDITIONED *S-4*

This ill-fated ship has been refitted for the purpose of testing various safety devices. She is shown being submerged off Block Island for tests.

Submarine Service *for* Profit *and* Pleasure

By LIEUTENANT JAMES KIRKPATRICK, JR., *U. S. Navy*

THAT the basis of dislike is usually ignorance is nowhere more evident than in the submarine service. A few years ago the writer was one of a group of junior officers giving a "sympathy party" to a shipmate about to leave us for submarines. Of the unpleasantness of the life we had heard and with these half truths in mind we were happy to know that it was someone else who was to leave. The younger officers of the general service have a scant picture of submarine duty and, without a doubt, a distasteful one.

The writer served nearly three years on destroyers, the type generally believed the most useful antisubmarine weapon, and he now believes that, at that time, the lack of general knowledge among destroyer officers of the potentialities and weakness of submarines would have greatly decreased the efficiency of antisubmarine operations. Other things being equal, the destroyer "skipper" who had had a submarine command would be a far more formidable antagonist for an undersea boat than an officer without such experience. In a lesser degree the same would of course be true of officers on all types of vessels when a submarine menace was real or fancied.

The naval officer is the descendant of the first man who fought afloat. To do battle with ships the landsman became subordinate to the seaman. In seamanship alone does the officer of the line stand apart from the specialists, naval and civilian, who construct and repair his weapons and instruct him in their operation. Seamanship is an officer's sole professional subject which cannot be taught ashore and by book. The desire to excel in this branch of one's profession must exist in anyone whose love is for the Navy afloat.

During my service in destroyers it was the regret of the younger officers that their inexperience did not permit their handling of the ship except in ordinary maneuvering and position keeping. The heroes were the captains especially able in taking the boat alongside or in picking up a mooring buoy or boat with a minimum of effort. The abilities of various commanding officers in this line was, the writer recalls, of greater interest and moment to the younger officers and crews than the score of the ship at battle practice or in engineering competition.

The art of handling ships must be learned somewhere, and nowhere better than in the submarine service. Submarines are more easily handled than destroyers or larger vessels, but such advantage as that may give the submarine officer is neutralized by the fact that submarines maneuver daily about docks and tenders without regard for wind or tide, and maneuver in more crowded spaces than would be possible for larger vessels. Aboard most submarines all the officers handle the boat in rotation and usually almost from the day of first reporting for duty. Commands to helmsman and to the engines, the use of mooring lines, estimation of headway and of effects of wind and tide are matters far easier to discuss and describe on examination than to do correctly on the bridge.

Just as the beginner at dancing school must watch his feet and think what the next step must be, so the novice ship-handler must strain his mind considering each detail, with the probable occasional mistake which comes, not from ignorance of the rules, but from a failure to use his knowledge automatically. The young officer in submarines learns through daily opportunity this basic art of the seaman, and with the learning comes the pride of a talent not owned by the engineer or the landsman, but only by the full-fledged officer of the line. Thus does the handling of the boat give the officers of the service actual experience in the rudiments of big-ship handling.

A submarine, except of the largest class, carries no running boats, which requires on certain exercises and performances that the

submarine itself be used as a small boat. In recovery of torpedoes or a man in the water the submarine itself takes the place of the motor launch or whaleboat, and the small-boat seamanship continues with this larger vessel.

I recall well the indignation among a group of young destroyer officers when the captain of one vessel showed surprise and displeasure that his engineer officer did not know whether the main lubricating system was cross connected. Their viewpoint was that the engineer officer had done all that should be expected when he told his captain that the chief machinist's mate knew and he would ask him. I believe that I served with a representative group of younger officers in the general service and I know that their knowledge of the mechanical features of their departments was neither detailed nor thorough. In the submarine service this indifference among officers to location of pipe lines, positions of valves, and construction of parts, does not exist.

Possibly my case might serve as an example. Submarines are, from their nature, more dangerous to life in case of mistake or accident than other vessels. In one submarine the boat was flooded save for the two after compartments, where, without lights, persons who knew the location of tanks and valves, were able to blow out enough fuel and ballast to escape. I felt, from the first day aboard, a great desire to be able personally to do all that anyone could to overcome the dangers of any like casualty. Preservation of life, the strongest instinct, combines even with the most indolent character to give submarine personnel a desire to know that, I believe, in general, results in the acquisition of more detailed knowledge of the vessel and its machinery than is usual among officers of like rank in the service at large. Along with this there may be included the close association with the crew and the machinery itself. The fact that there are eight valves to be opened and closed in the officers' toilet gives the officer "for paper work only" something mechanical to think about. One result is that submarine officers talk shop perhaps more than any other group, and seem to enjoy it.

Of late years the Diesel engine has replaced steam in much new construction on land and sea. To the officer interested in engineering the opportunity to become familiar with this type of power plant can best be acquired by submarine service. In as much as many operators and designers predict the gradual replacement of steam power by Diesel and Diesel-electric, it behooves the engineer of the future to consider the desirability of acquiring some first-hand information on this subject where it is the primary source of power.

As a practical school of direct-current electricity the submarine offers more advantages than any other type of vessel. Assuming that the hull does not leak the next item in importance to the boat is its electrical installation. The main storage battery is the heaviest and perhaps the most expensive unit of the vessel, and it is not fool proof. The submarine officer soon learns enough about batteries to save the situation when a garageman suggests adding acid to the one in his car, or when his wife lets the radio battery run down and then puts it in a corner and asks for a new one.

It would be possible to continue for some time mentioning certain professional information that is indigenous to submarines. The writer took his last professional examination for promotion during his submarine duty and can say truthfully that practical information gained from routine duty in this class of ships served to answer far more questions for him than could be classed as matters peculiar to any other type of vessel.

To young officers who have been, for all practical purposes, under instruction on larger ships, submarine duty affords an opportunity to shoulder responsibility and to judge themselves and be judged on actual accomplishments. The self confidence bred by opportunity to show initiative and success in their undertaking will probably be theirs. Should they be due for failure on larger ships, they will fail the sooner but should they be deserving of success, they will achieve it the more surely.

The personal gains and losses of the life will probably balance. The greatly increased discomforts at sea will be equalized by more time in port. The life gives little privacy, but it breeds men confident of themselves, who will never be of less value to the service for the years they spent in the "sub boats."

Some Aspects *of our* Present Naval Policy

By MIDSHIPMAN (NOW ENSIGN) ALBERT O. MOMM, *U. S. Navy*

SINCE the end of the World War an attempt has been made by those who control the Navy to bring it back to normalcy; to provide the fleet with the necessary ships whose construction was delayed in the stress of the war, and to place in reserve the ships which were hastily constructed to combat the submarine menace. A well-balanced Navy, with all of the necessary auxiliaries, is desired.

There were, at the end of the War, 305 destroyers which had been built at the various yards of the country in haste, in a moment of need. Of these, 243 were built during the two years that we were in the war, and therefore were approximately of the same design and date. Of the 305 destroyers, 199 have been placed in reserve or transferred to the Coast Guard, and there are 106 in the fleet. The Navy must replace, therefore, at some time in the future, a type of ship a great number of which will become obsolete at one time. There are no destroyer leaders in our Navy, although the General Board has sought these valuable adjuncts.

In so far as light cruisers were concerned, the United States was not so fortunate. The construction of ten modern light cruisers, authorized in the naval program of 1916, was halted to allow the production of the necessary antisubmarine types of vessels. At the beginning of the War the United States had three cruisers which approached the qualifications of fast cruisers, and these had been commissioned as far back as 1908. So the United States at this time was without a single modern cruiser, although this type of vessel had been long sought by the Navy. After the War, the construction of the ten light cruisers of the 1916 program was commenced, the keel of the first ship being laid in December, 1918. No more cruisers were provided for until the end of 1924, when eight more cruisers were authorized. These cruisers are of the 10,000-ton type, and are now under construction. The first of these should be completed in 1929.

As to the number of battleships which our Navy should have, this was settled by the diplomats at Washington in the Limitation of Armaments Conference of 1921-22, when the United States offered to maintain in commission eighteen ships of the first line, scrapping or abandoning construction on the ships in commission or under construction.

The problem which then faced the Navy was to modernize the battleships in commission to a degree that would not violate the terms of the 5-5-3 treaty of the Washington conference. The older ships, through special Congressional appropriations, have been modernized extensively. Blisters, to protect the ships from torpedo or bomb attack, have been added, and protective decks to withstand aircraft bombs and high-angle gunfire have been installed. In addition, the older, coal-burning battleships have been altered into oil-burning vessels, by installing boilers taken from the ships which were under construction at the time of the Limitation of Armaments Conference in 1921. The elevation of the turret guns on the older battleships was also contemplated, but, due to the widespread belief that this operation would violate the terms of the treaty, no action was taken upon it at that time.

In comparing the strength of our naval force with the forces of other nations, the customary method of contrasting unit for unit has a great weakness. It does not consider the organization of the forces. Just because Great Britain has fifty-one cruisers in commission or under construction is no argument that we should have the same. Likewise, our larger fleet of destroyers does not mark the superiority of our fleet. Superiority is considered in the power of the capital ships, and the ability to use this force to the greatest advantage in a crisis of war.

To accomplish this, in an actual engagement, the location of the hostile force, and its arrangement, must be known. Fast, powerful vessels are required to gain this information, and to prevent similar scouts of the enemy from gaining information regarding our own fleet. It is a game of hide-and-seek, wherein the fleet which happens to be prepared to fight at the proper moment and in the proper direction has the advantage.

When we consider the types of capital ships against which our ships might have to be used, certain advantages and certain disadvantages of our ships of the line are evident. With the exception of aircraft carriers, ships of war having a displacement of over 10,000 tons, or a battery of guns larger than eight inches in caliber, are classed as capital ships. They represent the ships which were, in the days of sail, the "ships of the line." This meant that they were powerful enough to remain in the line of battle. From this term originated the title of the battleship: the "line-of-battle ship." The capital ship includes in its category two important types of vessels: the battleship and the battle cruiser. The battleship is heavily armored, has guns of the largest caliber, and is of relatively low speed. The battle cruiser is not so heavily armored, has few guns of the largest caliber, and has a high speed. We have no battle cruisers in our Navy, the British have four, and the Japanese four. The ratio of numbers as prescribed in the 5-5-3 treaty, however, applies to the total number of capital ships, and we therefore have four more battleships, in proportion, than Great Britain and Japan.

Our entire fleet of eighteen battleships was designed to have a uniform speed of twenty-one knots. This, of course, places our ships at a disadvantage in maneuvering and gaining position, due to inferior speed. Britain has four battle cruisers which can make at least twenty-eight knots, five battleships which can make twenty-five knots, seven battleships which can make twenty-three knots, and four battleships which can make only twenty-one knots. Japan has four battleships which can develop at least twenty-seven knots, and six battleships which are designed for twenty-three knots. It is truthfully said that the speed of a fleet is limited to the speed of its slowest unit, so our lack of speed is not as great a handicap as might be at first supposed. However, a superiority in the speed of a capital ship allows the vessel to choose its own range, and the great advantage of *long ranging ability* and high maneuvering speed can be readily realized.

The disadvantage of the low speed of our battleships could be minimized if the ships could equal or exceed in range the faster opponents with which they would have to engage. But this is not the case. When the older battleships of our Navy were built, the maximum range was seldom, if ever, over 20,000 yards. This range required the guns to be elevated to about fourteen degrees. After the war, however, director fire developed by leaps and bounds, and effective ranges rapidly increased. Our older battleships were soon outranged by the capital ships of other nations, which had greater angles of elevation.

At present, although our five newest battleships have a range of over 30,000 yards, our thirteen older ships have a maximum range of 20,000 and 22,000 yards, while all of the British ships have ranges of 24,000 yards and over. The *Hood* and the two *Nelsons* of the British Navy have ranges of over 30,000 yards. It can therefore be seen that our fleet would have a preponderance of fire when entering an engagement, at 30,000-yard ranges, and the British would have a preponderance of fire when around 23,000-yard ranges. The elevation of the guns of the Japanese capital ships is not definitely known, but it is probable that these, also, can outrange our thirteen older ships.

It can thus be seen that something must be done to prevent a faster enemy fleet from remaining within its effective range, while our own ships could not reach them. This means increasing the elevation of the guns of the older battleships.

Let us imagine that our fleet is called upon actively to fulfill the mission for which it was designed. It is hoped that such a thing will never occur, but the fleet must be prepared at all times, for in preparedness lies strength. The fleet is to defend the nation or to protect our rights. How is it to do this? It cannot await the enemy. If the fleet is to defend our shores from an aggressor it would have to move out to meet the aggressor while concentrated, for the fleet would have no strength whatsoever if it were to divide its forces along the coast.

In order to meet an enemy fleet, it would first be necessary to find the hostile force. How would this be done? Battleships, with their slowness of movement, could not expect to find the foe. Fast vessels would be necessary. Destroyers could not be used for this purpose for they would not have the requisite size and strength. There are three essentials for a vessel which could do scouting of this kind. In the first place, it would have to be a high-speed vessel. In the second, it would have to be powerfully armed, so that it could repel enemy light craft which would try to prevent it from gaining information. Lastly, it would require a large steaming radius. To accomplish these, the vessel should be of large size.

Let us assume that of a number of scouts sent out to seek the enemy in a certain area, one of the scouts has sighted part of the enemy force. The actions of the scouts up to the point when the enemy was sighted, were of a strategical nature. The scout has sighted the enemy, and reports to the main body of battleships and to its companion scouts this information. All hasten to concentrate toward this point. The actions which now take place are of a tactical nature.

The part of the enemy body which was sighted was probably part of the so-called screen. A force of capital ships is usually protected by a body of fast vessels which attempt to prevent the main body from being discovered. This body of fast vessels operates at a great enough distance from the main body of battleships, so that if an enemy scout sights part of the screen it is unable to see any part of the main body.

The purpose of our scouts, when our main body has reached the area of operations, is now to pierce this enemy screen, and find the location of the enemy capital ships. For this purpose scouts of great speed and gun power are necessary. Our scouts, if they are powerful enough, will be able to pierce the screen. In a short time they will probably sight the enemy main body. The information as to the size of the enemy battleship force, the direction in which it is moving, and the way in which it is formed, is all sent back to the commander of the forces, who arranges his plan of battle accordingly. The arrangement of the units of the main body at the time of starting the big-gun duel with the enemy is of an importance which can not be overestimated. If our battleship units should engage parts of the enemy which have become separated, the concentration would probably result in success for us. Likewise, if the enemy should discover that there was a weakness in our formation, this information would be of extreme value to them in laying out their plan of battle.

With this picture in mind, it is easy to realize how helpless our battleships would be without an adequate number of large light cruisers to screen its movements and to gain information of the enemy. It also shows the futility of destroyers acting as substitutes for these operations.

To make our fleet of slower battleships effective in war, therefore, it is necessary to make the two following reforms:

(a) Increase the elevation of the turret guns of the thirteen older battleships;

(b) Provide the fleet with a group of powerful information-seeking vessels.

In naval warfare, the operations of aircraft with the surface ship are of primary importance. When it is considered that the fighting plane, which is always necessary in active aircraft operations to pave the way for other planes, has a cruising endurance of only two or three hours, its dependence upon the surface ship is easily realized.

To accomplish the transportation of aircraft with the fleet, two general methods are used: planes can be carried on combatant ships such as capital ships and light cruisers, or they can be carried on specially designed ships. To guarantee a maximum number of planes taking part in a naval engagement, each battleship and each light cruiser is equipped with the greatest number of planes it can handle, and as many aircraft carriers as possible accompany the fleet.

At present our fleet has two modern aircraft carriers, the *Lexington* and the *Saratoga*. It is generally admitted that these two ships are the largest, swiftest, and most powerful aircraft carriers afloat. These ships, however, due to their great size, would be vulnerable to attack, both by surface ships and by aircraft. Each of these vessels carries approximately seventy planes of various types. This does not approach the number of planes which would be necessary in a naval engagement. More carriers are essential for the proper operation of aircraft with the fleet.

The construction of the large aircraft carriers of the *Lexington* type has been often criticised, both here and abroad. These two carriers were necessarily large, because they were constructed from the hulls of two vessels which would have been 43,500-ton battle cruisers if they had not been changed by the edicts of the 5-5-3 treaty. It is said that the construction of a few carriers of such a large type is similar to "putting too many eggs in one basket." This has been realized by the General Board, which subsequently has sought the construction of smaller carriers. Plans have been developed for a 23,000-ton carrier. When agitation arose in Congress recently for more ships for the Navy, the authorization of five small carriers of 13,500 tons displacement was originally incorporated in the bill, but this was subsequently reduced to one such carrier. So the situation remains, with two modern carriers in commission and a possibility of a third small ship.

To realize the importance of aircraft strength in the fleet's strength, let us return to our imaginary engagement.

In seeking the position of an enemy force, the area in which such force might be located would probably be very large. A great number of vessels would be required to search this area. With the aid of airplanes the limit of visibility of each scout would be immeasurably increased. Each plane could leave the scout one or more times during the day, and search the sea as far as its radius of flight would enable it. For this purpose, in our Navy, each light cruiser is provided with two observation planes, which can be launched from the cruiser by catapults and be hoisted aboard upon the completion of flights.

After contact with the enemy fleet is made, the importance of aircraft superiority becomes evident. Aircraft, when operating with the fleet, have certain individual missions to perform which increase the striking force of the fleet upon the enemy. The most important of these, in the popular mind, is the bombing plane. A parallel type is the torpedo plane. The plane, however, plays another part which is just as important or even more important when it acts as an observation or spotting plane. By spotting is meant the observation of the fall of shots from the battleships, and sending back the corrections in aim to be made. In this way hits can be made upon a target which cannot even be seen by the firing ship, such as when the target is over the horizon in long-range firing.

The control of the air in a naval encounter, therefore, is the determining factor in the outcome of the engagement. The fleet having control of the air can use its bombing, torpedo, and observation planes with little interference from the air, whereas the fleet losing control of the air must do without these striking arms. How can our fleet gain and maintain control of the air? By having a superior force of fighting planes at the place of engagement, control of the air can be gained easily, and air attacks can be carried on against the surface ships without interference of enemy planes.

In a naval engagement of this kind, the procedure or action can be easily imagined. After our scouting force had discovered the screen of the enemy forces, the planes could fly over the screen and determine the characteristics of the enemy main body, if they were not repelled by enemy aircraft. When the fleets approached each other and prepared for an engagement, planes would be launched from the ships, and preparations for an engagement would be made. The fighting planes would leave the ships first. The other types of planes would not be launched until the supremacy of the air was gained. The fighting planes of the two fleets would engage. The outcome of this engagement would determine which of the two fleets was to have the supremacy of the air. The fleet gaining this control of the air could now launch its torpedo planes, its bombing planes, and its observation planes. The defeated enemy could not send off its planes, for they would be destroyed by victorious pursuit planes. Without observation planes in the air the battleships could not fire with any degree of success until the capital ships of the two fleets were well in the range of visibility. Meanwhile, by means of airplane spotters, the fleet having control of the air could destroy the enemy before the latter could come within visible striking distance. At the same time, the torpedo and bombing planes could strike the enemy capital ships, either crippling them or distracting their attention from their most important activity, the firing of the main-battery guns. All of these assumptions are considered for an ideal day,

with clear atmosphere. In case of poor visibility, if the planes could take off, the advantage of the plane would probably be augmented, for, with the two fleets invisible to each other entirely, the planes could direct the firing of the ships. Surprise airplane attacks would be easier, also.

It might be said that this is all very well, but if such be the case, why doesn't the Navy build up a great air fleet, instead of trying so hard to obtain additional surface vessels? Aircraft, in their present stage of development, are rapidly changing in design. Airplane types which would be the latest word in design today would be obsolete a few years hence. This is not so in the case of surface vessels whose designs change slowly during the years.

The present policy of the Navy is to experiment upon and design the different types of aircraft continuously, confining its efforts to a few units of each design. Enough airplanes are maintained to train the necessary personnel for time of war. The latest types of planes are available as models for quantity production in case the necessity for them arises. Surface warcraft cannot be built in a short time. A capital ship requires, on the average, four years for its construction. The time required for the construction of our 7,500-ton cruisers averaged over three years.

The Navy thus attempts to construct an adequate surface fleet, at the same time developing a nucleus of aircraft types which can be expanded in time of need.

If the Navy is weak it invites attack, and when it must be suddenly strengthened to meet a national emergency the expense involved is even greater than that required by the upkeep of the balanced fleet. This was evident in the World War, by the sudden demand for destroyers and other anti-submarine vessels, and the great expense which resulted. Also, a ready fleet will make a more reluctant enemy.

In order to have a fleet which would be able to cope with other powers, in order to approach the strength of other powers on the seas, our Navy has the following needs:

1. Gun elevation on the thirteen older battleships, in order to increase the maximum range to that of capital ships of foreign navies, thus balancing our handicap of lower battleship speed.

2. Numerous scouts of the largest possible size and power commensurate with the terms of the 5-5-3 treaty. These scouts should be powerful enough to engage any enemy scouts, and speedy enough to be able to avoid any battle cruisers which they might encounter.

3. Aircraft carriers, to provide the fleet with an adequate number of planes to assure control of the air in a naval combat.

4. Destroyer leaders and destroyers. We have no destroyer leaders in the Navy, and they therefore would be a new type of vessel. A few destroyers should be provided for, to permit a gradual replacement for a class of ships which will become obsolete almost at one time.

The General Board of the Navy has long realized these necessities, and has attempted to have them carried out. It is difficult, however, to place the importance of the Navy before the people. The relation between the Navy and the people in the United States is not as close as it is in Great Britain. Throughout the years of its existence, the British Empire has well realized that its security rests on its fleet. In our own country the Navy does not receive the recognition which it should.

The Navy, in attempting to gain the passage of legislation for new warship construction, should attempt to make clear to the people the reason for the necessity of such improvements. Newspaper articles, explaining the functions of the components which form the fleet, should be very successful. Of late, the Navy has gained much popular advertisement through the publication of numerous pictures of the ships of the Navy. But these should be supplemented by editorials on the whys and wherefores of such ships, so that the people paying the cost of the Navy will not think that they are investing their taxes in an unprofitable organization.

The Navy is the insurance company to the nation. The old proverb, "In time of peace prepare for war," does not sound unreasonable when it is understood that preparedness is not only a means of security, but of economy also. There is nothing so important to the Navy at present as a moderate building program gradually replacing the ships which had done their part before and during the World War, and adding the necessary auxiliaries which the fleet has never had.

Modern Fog Navigation

By LIEUTENANT COMMANDER A. N. OFFLEY, *U. S. Navy*

IN THE future navigation of ships, under-water sound and the so-called "sonic depth finder" are destined to play an increasingly important rôle. The electrical depth finder already has emerged from the experimental stage and may now be considered a practical navigational instrument. At least two types have proven their worth in practical operation in the service; one of these is available as a commercial instrument, while the other is available to the Navy, at least insofar as its inventor is concerned.

It is not the intent of this article to give a technical description of the instruments, but rather to indicate, through a narrative of actual experiences, some of the uses to which they may be put. However, a general discussion of elementary principles may prove of interest.

Two methods of sonic depth determination have been the subject of experiments, namely the angular method and the time-interval method. In the former system, a source of sound is propagated under water at one end of a base line. At the other end of this line is an instrument capable of determining the angle at which the returning sound waves, or echo, from the bottom are received. From the base line of known length and the measured adjacent angle, other elements of the plane right triangle involved are readily computed, and one of the elements is the depth, as will be seen from Figure 1. This method has several objections, not the least of which are the inaccuracies introduced by inequalities of the contour of the bottom, the pitching of the ship, the relative shortness of available base line as the depth increases, and the "personal equation" of the operator in whose ability to center the binaural effect much reliance must be placed. Furthermore, the angular method does not lend itself readily to direct visual means of recording the depth obtained. It has, therefore, been discarded in the more modern types of sonic depth finders.

The time-interval method employs the very simple principle of measuring the time elapsing between the moment of propagating a sound and the instant of the return of the echo from the bottom.

For purposes of navigation, it is sufficiently accurate to assume that sound waves travel in sea water at the rate of 4,800 feet (800 fathoms) per second. If, therefore, one second elapses between the instant of propagating a sound impulse and the instant of detection of its echo, the depth is 400 fathoms; i.e., the sound has traveled a total distance of 800 fathoms in its course from the source of sound to the bottom and return to the surface. On this premise, it is, of course, perfectly feasible to graduate the time-measuring device in fathoms rather than in time interval, thus permitting a direct depth reading to be indicated.

In practice, it is necessary to compensate for certain factors, the most important of which are due to mechanical and electrical

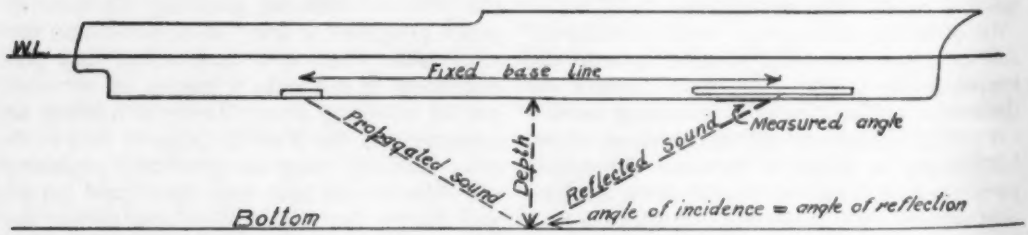


FIG. 1

lag in the instruments employed and to the depth of immersion of the source of sound and of the echo detection device. These, however, are usually fixed quantities and are readily eliminated from further consideration during calibration of the instrument.

The time-interval method of depth finding has been employed with varying degrees of accuracy for some time. A rather crude application is available to any navigator who has at his disposal a source of sound propagation, a means of audio reception of under-water sound, and a stop watch; but the human nerve system does not "click" with sufficient rapidity to render this means accurate to within a hundred fathoms. Modern sonic depth finders are the means of refinement of the "stop-watch" method.

As already stated, two types of sonic depth finders at present seem to give promise of eventual adoption and to fulfill reasonable requirements as to ruggedness, simplicity, accuracy, and reliability. They are essentially alike in principle, in operation, and in the results obtainable. As an indication of the utility of these instruments, the one invented by Lieutenant (j.g.) L. P. Delsasso, U.S.N.R., may be taken as a prototype. With proper equipment under service conditions, depths are easily determined to the nearest fathom in water of less than 400 fathoms and to the nearest ten fathoms if over 400 fathoms deep. The least actual depth below the keel line, determinable with present apparatus, is about five fathoms; but when navigating at such depths, reliance can and should be placed in the lead line and no further need exists for the sonic machine.

The depth-indicating instrument is compact and can readily be installed in the chart house or in the pilot house. It can be operated, and its indications read, by the layman, so that it does not fall under the category of "another radio gadget" (a sobriquet which seems well calculated to discourage the adoption of any new device, however useful). The depth is indicated visually, on a circular scale graduated in fathoms, and readings are obtainable once each second in depths of less than 400 fathoms, or every ten seconds in deeper waters, so that practically a constant and instantaneous knowledge of the depth may be had.

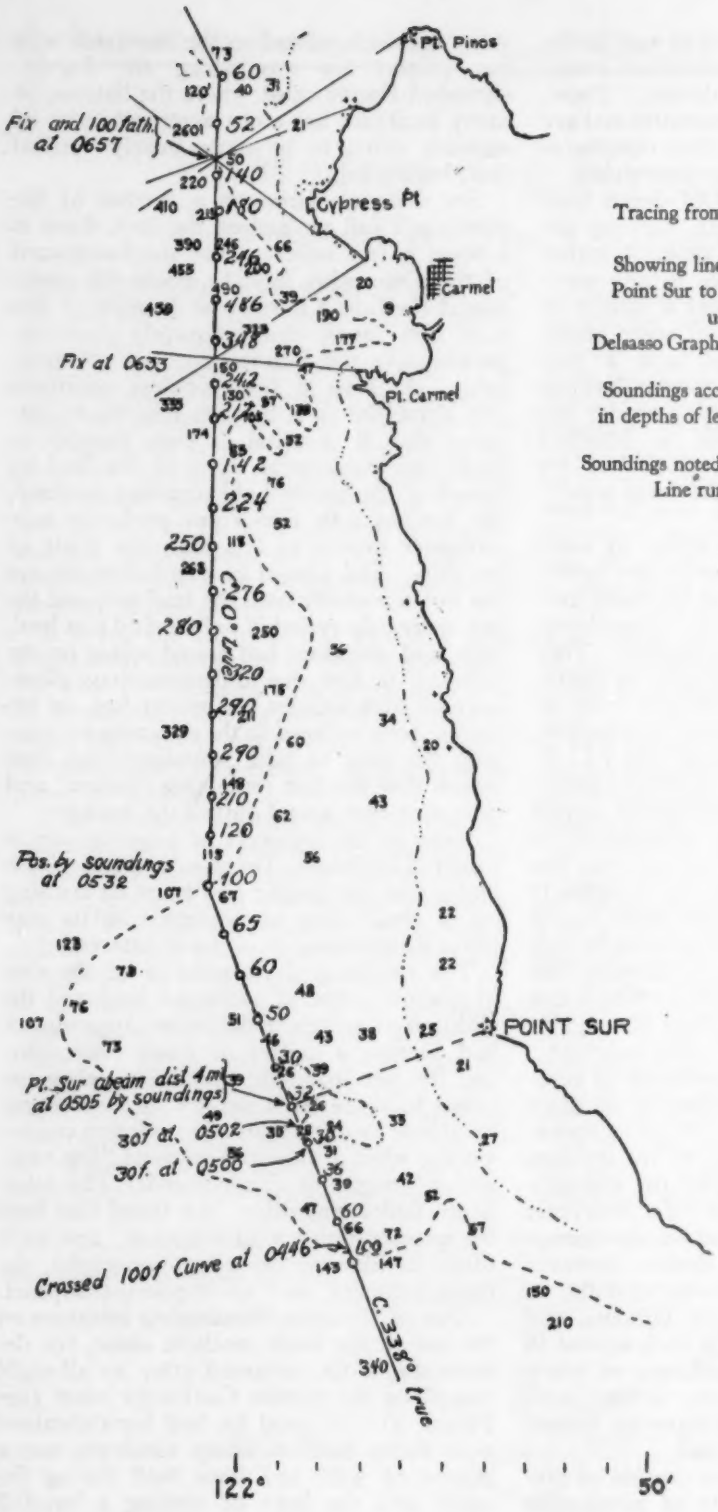
That a reliable instrument capable of giving continuous soundings is of inestimable value will be apparent to the navigator who has groped his way along the fog-enshrouded Pacific coast where the bottom, in many localities, has a characteristic habit of seeming often to be more nearly vertical than horizontal.

For instance, although a perusal of the charts will fail to disclose the fact, there is a point a few miles to the southwestward of the Coronados Islands where the continental shelf, in a horizontal distance of less than 400 yards, drops abruptly from approximately 100 fathoms to over 500 fathoms. At least a few luckless mariners can attest the fact that, in less linear distance than it is usual or even feasible to make two consecutive casts of the lead by means of the familiar old sounding machine, the bottom may rise from perfectly safe navigable depths to less than the draft of the ship. And who of us who follow the sea has not repeatedly seen the lead cast and the line arduously reeled in only to find that lead, tube, and container had found solace on the bottom? In fact, due to parsimonious allowance of such articles, the writer has, on occasion, been reduced to the necessity of stopping the ship to take soundings and thus insure that the last remaining "sinker" and tube container would outlast the voyage.

Some of the instances of practical use to which Lieutenant Delsasso's sonic depth finder was put during two years of cruising on a small ship of uncertain habits may prove illuminating or, at least, interesting.

The steaming characteristics of the ship in question, due to increased load and the addition of certain under-water appendages, had become a matter of much conjecture, and the two magnetic compasses, when exposed to abuses in a seaway, proved so unreliable as to more than add spice to a coastal voyage when a thousand miles of "fog navigation" might be encountered. The sonic depth finder was often "the jewel that kept the watch running with precision," and quite often its likewise modern accompanist, the radio compass, was an important adjunct.

One of the most illuminating instances of the use of the sonic machine alone, for determining a fix, occurred after an all-night run along the middle California coast (see Figure 2). A good fix had been obtained near Point Buchon, about sundown, and a course of 338° had been held during the night with the hope of making a landfall



Tracing from C & G. S. Chart
5402
Showing line of soundings run
Point Sur to Point Pinos, Calif.
using the
Delsasso Graphic Acoustic Sounder.

Soundings accurate to one fathom
in depths of less than 400 fathoms.

Soundings noted at 5-minute intervals
Line run July 9, 1926.

FIG. 2

on Point Sur by daybreak. But, as may usually be expected during the month of July, Point Sur was obscured in billows of fog. Visibility was limited to two miles and the sky was overcast. At 4:00 A.M., the sonic was started and a depth of 340 fathoms indicated. At 4:46 A.M., the 100-fathom curve was crossed. And right here, attention may be called to one of the many valuable features of a continuously recording depth finder. The exact time of crossing any depth curve is made available. At 5:00 A.M., we crossed the thirty-fathom curve; at 5:01, twenty-eight fathoms; at 5:02, thirty fathoms again. Sufficient data had then been obtained to determine, without much doubt, by means of the well-known tracing-paper method, that, at 5:05 A.M., Point Sur would be abeam at a distance of four miles. In other words, an accurate fix had been obtained by means of soundings alone. The course was held, not to a fixed minute of time, but until the 100-fathom curve was again crossed, when the course was changed to north. This procedure gave an additional check on the navigation, as it was evident that, if our presumption of the 5:05 A.M. fix was correct, the 100-fathom curve should be re-crossed about 5:30 A.M. Actually, this occurred at 5:32 A.M. and an absolute verification was obtained an hour later by cross bearings.

A glance at the accompanying chart will show that, in addition to a fix, the extreme accuracy and frequency of the soundings enabled also a determination of the actual speed being made good over the ground and the *apparent* compass error; i.e., the error due to the combination of deviation, variation, and *leeway*, which, in a vessel of light displacement, frequently varies considerably from the theoretical compass error. Furthermore, it should be remembered that these factors were available when the usual "aids to navigation" were entirely lacking.

An incident involving combined use of the sonic depth finder and the radio compass may also be recited. Most mariners are aware of the dangers which lurk in the vicinity of Cape Mendocino, off the northern California coast, the usual turning point for ships bound coastwise. Here, also, bad weather is frequently met. Blunt's Reef Lightship stands guard some four and a half miles offshore at the seaward extremity of a series of dangerous rocks and shoals.

Leaving San Francisco on the forenoon of a July day, the ship encountered strong gales and heavy head seas during the ensuing afternoon. During the night, speed was slowed to ease the ship and avoid heavy pounding. Steering was difficult owing to the oscillations of the compass, and no accurate estimate of speed being made good was possible. Unfortunately, charted soundings along the direct course between San Francisco and Blunt's Reef are not sufficiently frequent for accurate navigational purposes. When the next day dawned, there was reason for much question and doubt as to just where we might be (no fix had been obtainable in nearly eighteen hours). Visibility did not exceed one mile.

To put it mildly, any idea as to position was very approximate. The sonic machine was put to work and indicated a depth of 810 fathoms. Inspection of the chart (Figure 3) will show that this information alone left the question of position still indefinite. A radio bearing was requested and received as 217° from Table Bluff. From this, it was fairly evident that the ship's position was at either "A" or "B". It was noted also that Table Bluff's bearing line passed within probable sighting distance of Blunt's Reef Lightship. Course was therefore laid directly down this bearing line. The crossing of the 100-fathom curve, eight minutes later, gave an accurate fix which was positively confirmed upon sighting the light vessel after a twenty-minute run.

While it is usually well to obtain confirmatory bearings from a radio compass station, the above incident illustrates the utility of even a single good bearing when a continuously registering sounding instrument is available. In fact, the soundings almost immediately confirmed the compass bearing.

On one occasion, while en route from Seattle to Port Angeles, Washington, a heavy fog set in while the ship was off New Dungeness Spit, some thirteen miles from her destination. The currents in these waters are strong and uncertain. It was noted that the ten-fathom curve parallels the shore in a fairly smooth line at a distance of about one mile off shore and that it leads directly into the middle of Port Angeles harbor. The ship, being then in some sixty fathoms, was headed shoreward until the sound machine indicated twelve fathoms, whereupon the

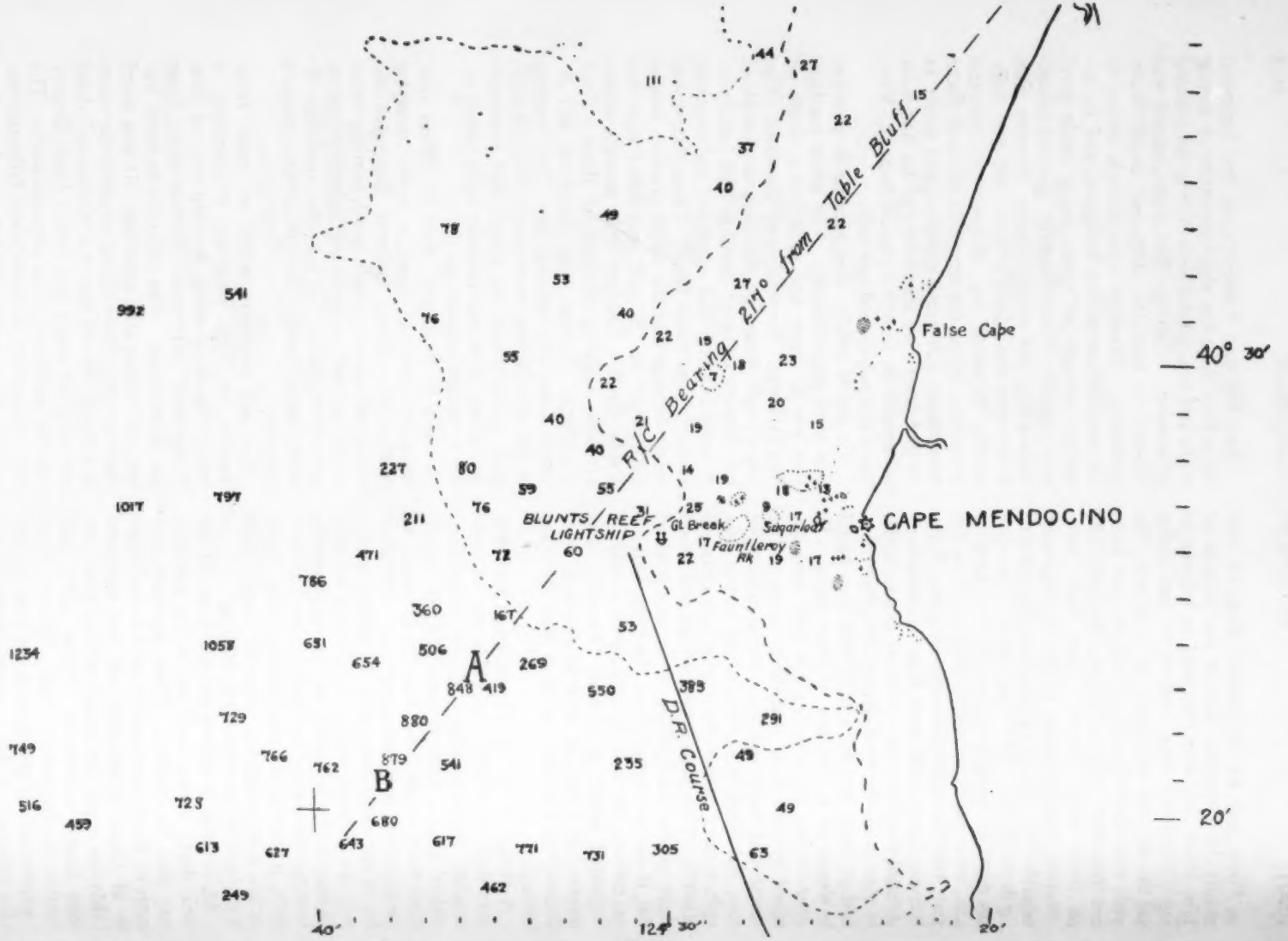

R/C Bearing 214° from Table Bluff
False Cape
CAPE MENDOCINO
BLUNTS REEF LIGHTSHIP
Gl Break
Sugarloaf
Fauntleroy
A
B
D.R. Course
40° 30'
20'
124° 30'
40'
20'

FIG. 3

rudder was put over and she completed the 90° turn on the ten-fathom curve. Setting the course to follow the general trend of the ten-fathom curve, the ship was readily piloted so as to maintain a minimum reading of eight fathoms and a maximum of twelve by merely watching the depth recorder and coaching the helmsman accordingly. On this occasion there was sufficient seaway in the Straits of Juan de Fuca to be noticeable in a small ship, and, although the fog siren on Ediz Hook was not heard, the cessation of the seaway gave indication that the lee of Ediz Hook had been reached. Anchor was let go, and when the fog cleared the ship was found to be anchored within 200 yards of the estimated position.

Although the lead line was used as a check just prior to anchoring, the readings of the sonic depth finder proved quite accurate and far more useful, and the use of the hand lead could have been dispensed with in perfect safety. So far as the writer is aware, this is the first instance of such use of an automatic sounding machine.

Many other incidents involving the use of the sonic depth finder might be described; but the above are characteristic and, it is hoped, will serve to give some idea of the practical value of the instrument and the use to which it may be put. It is quite possible that the time is not far distant when the navigator's main reliance will be placed in his depth finder and the present astronomical methods of position fixing will be regarded as a relic of the age of the magnetic compass. However this may be, it is certain that dead reckoning will become less approximate and that captain and navigator will be relieved of much anxiety when a sonic depth finder, capable of performing such feats, is among their "shipmates."

Captain Plant

By LIEUTENANT COMMANDER GLENN HOWELL, *U. S. Navy*

WILDLY, grandly beautiful, thrilling, fascinating, the Yangtze Gorges will forever be a wonder spot of the world. That they are so little known to the average run of mankind is due to their remoteness from the seacoast, the difficulties attaching to travel up the Yangtze, and the disturbed political conditions of China.

The Yangtze debouching through these gorges to the great plain below is the only practicable outlet to the world from Szechwan, a great province the size of Texas. The region is mountainous and very fertile and would be wealthy to a degree could an end be put to the ruinous exactions of the military and the bandits.

For centuries the trade to and from Szechwan was carried in great junks up and down the gorges. They left Ichang in flotillas. There were two or even three hundred trackers to each junk, wretched, patient creatures content with the most meager living. In the summer these men wore no clothing. From dawn till dark, harnessed to great lines from the junks, they toiled and strained and struggled against the terrific currents and the impossible whirlpools. At times inch by inch, struggling with every ounce of sinew in their starved bodies, they agonizedly worked the junks over the rapids. But it took their hearts' blood. They lived short lives. Sometimes great whirlpools took charge of the junks and dragged whole lines of harnessed, shrieking coolies from the precipitous paths cut in the cliffs and plunged them into the boiling river to death.

When the flotillas arrived at the rapids, the trackers of several junks were harnessed to each junk in succession, and these hundreds of coolies, straining together to the savage beat of the drums and the shouts and blows of their taskmasters, inch by inch pulled the huge craft up the boiling, roaring river to the quieter waters above. There was never any chance to shirk, for the overseers continually ran up and down alongside the taut lines tapping the harness of each straining figure. And were the harness slack woe betide its wretched inmate, for crack! came the ready whip down upon his naked back.

The three hundred and fifty miles from Ichang at the bottom of the gorge to Chungking averaged three months of time, and for his services for the voyage each tracker received three or four Mexican dollars in addition to the rice and tea he may have consumed en route. Then for a fortnight he lolled in "Forty Cash Row," filthy hovels built on the bank of the Yangtze at Chungking outside and below the city wall. Like sailors the world over he was welcome there so long as his money lasted. Then he sought a down-bound passage in which he worked his way back to Ichang without other compensation than his chow en route. A sad, cheerless life he led. However, it did not last long, for the estimated average length of service of a tracker was seven years. And if he escaped drowning and died a natural death from disease his corpse was thrown overboard into the devouring river with no more ceremony than would be accorded a dead rat.

From the dead low level of midwinter the spring rises and summer floods force the confined waters to unbelievable heights. Official records exist which show that the difference in one year in the narrowest gorge between the extremes of low and high levels was 220 feet. Even at the comparatively broad reach upon which Chungking is located, a rise or fall of a foot an hour is a common occurrence.

Some years ago the writer one afternoon umpired a baseball game between his deck and engineer forces on the sloping beach opposite Wanhsien. During the night the river began rising and the vessel dragging, and at four o'clock in the morning the ship was got underway, moved in, and anchored on home plate.

It can readily be seen what an impossible task piloting a vessel in such a river would be. There are innumerable rocks and shoal places, rapids and races, whirlpools and backwashes to be encountered. And upbound craft of all characters must hug the bank to avoid the terrific currents in the tongues of rapids and the races in the middle of the river. Even at one level it would be a difficult task for a pilot to master all the necessary details, particularly when the penalty of even a slight misjudgement is immediate wreck and ruin. But with all levels to consider it is obvious that the task of becoming a pilot presents practically insuperable difficulties. The *laudas* (pilot-masters) of the junks knew the river, but they were invariably elderly men who had spent their entire lives in junks above Ichang and had stored up through the years every atom of information regarding these reaches that they could obtain either by observation or instruction.

The question of the possibility of steam navigation of the gorges was first raised by a Briton, Archibald Little, in 1889. He built a small stern-wheel steamer for Upper Yangtze service, but the Chinese government would not allow it to proceed above Ichang. However, in 1898 Mr. Little finally accomplished his scheme and reached Chungking with a small steam vessel. He then built a side-wheeler, but barely had this craft completed her maiden voyage to Chungking when the Boxer trouble broke out. The ship was commandeered and was eventually sold to the British government, which used her as a river gunboat.

Then came the total loss on her maiden voyage of a German steamer. This gave an effectual setback to all mercantile-marine schemes for the Upper Yangtze, though gunboats continued making occasional trips to Chungking and beyond during the safest navigational seasons. In 1908 the Chinese themselves attacked the problem and built a successful tug which towed lighters alongside. This was slowly followed by other craft until a score or more steamers were operating regularly in the gorges. The losses were frequent, but the freights were high and those companies which were properly managed made excellent profits.

And now we come to Captain Cornell Plant.

In a club in London, one day, Mr. Little was describing the gorges to a circle when one of the group told him that a friend of his had just returned from many years of service as master of a ship operating on the Tigris and the Euphrates. Thus it was that Captain Plant met Mr. Little. They immediately became friends.

The result of this meeting was that Mr. Little engaged the captain as master of his side-wheeler. Her disposition has been indicated.

Captain Plant was about forty years of age when he came to China. He promptly became as ardent a devotee of steam navigation on the Upper Yangtze as was Mr. Little. He insisted that the gorges were navigable by steamers. And for over twenty years he devoted himself to the furtherance of steam navigation above Ichang. He made voyage after voyage in the junk flotillas, and he learned from the old *laudas* their secrets. He gained the confidence of the Chinese, who admired and respected him. His enthusiastic championship of steam navigation of these reaches finally won over the hesitating shipping companies, and he lived to see a considerable fleet operating regularly and successfully above Ichang.

In 1915 Captain Plant became a member of the Chinese Customs Service and was river inspector of the district from Ichang to the westward. As the number of steamers increased so did his importance enlarge, and from Ichang to Kiating every junkman and sailor knew him. All hands liked him —foreigners and Chinese.

No pilot could obtain a license to pilot a steam vessel except after an examination by Captain Plant. He knew the river as well as a white man could hope to learn it. He was prepared to pilot vessels during an emergency, but he openly stated his unwillingness to attempt this service unless circumstances absolutely required it.

As his hair whitened his smile became more kindly and his personality mellow. We all turned to him with our troubles, and he was ever ready with advice and instruction. His extraordinary knowledge of the Yangtze, of the Chinese, and of the ships which comprised our Upper River fleet made his opinions very nearly infallible. His hard-headed common sense coupled with his tolerant kindliness endeared him to us. He was the godfather of our whole curiously diverse river-borne population.

When he was ready to retire the Chinese government built him a bungalow. Some forty miles above Ichang the Hsintan lies at the head of a beautiful gorge five miles long. As one looks up this gorge one sights a prominent hill which towers over the bend in the river in which rages and roars the Hsintan, always difficult and dangerous but at certain seasons of the year the most dreaded and vicious rapid in the river. On the top of this precipitous hill, almost overhanging the Hsintan and with a beautiful view down the gorge, was located Captain Plant's bungalow, in which he planned to spend his declining years. Urged to retire to Hankow or to Shanghai the captain shook his head, smiled, and explained that this wild region had for twenty years been the only home known by his wife and himself. He said with some hesitancy that he felt too keen a sense of responsibility toward his "boys" of the fleet to abandon them after his years of responsibility and patient instruction. This was his one great interest in life, and existence elsewhere would to him be without savor.

So he turned over his duties to a relief whom he had trained, and with his wife he retired to the bungalow above the Hsintan. He was never far from the window which looked down upon the swirling rapid and its roar trembled in his ears by day and by night. And neither gunboat nor merchantman ever shot down that furious reach or laboriously and painstakingly struggled up it without Captain Plant taking station by his window. It was our unfailing custom to salute the old man in passing—three blasts of the whistle. The response was always immediate—the flutter of his handkerchief as he leaned from the window.

We invariably felt as if he were a kindly, interested spirit who was willing us a safe passage and a successful journey. We felt that under this friendly and paternal supervision we should disappoint the old man badly if we failed, and I am sure that his presence up there above us spurred the quartermasters and firemen to greater efforts and the pilots to extraordinary caution.

Well, in the fall of 1921 Captain Plant and his wife, as kindly a soul as her husband, decided to go home for a visit. They had never been back to England since they first came out to the gorges and they decided to spend six months in the British Isles visiting such of their relations as remained alive and then to take a final farewell of their native land. They planned to return to their little home above the Hsintan and live out the remainder of their lives amidst the scenes which they loved best.

They were given a fine send-off by their friends all along the river. Then they went down to Shanghai and sailed for England. On the first day out the old man came down with pneumonia. He died before the ship reached Hongkong. The shock was too much for Mrs. Plant, and she quietly passed away as the ship was entering the harbor.

A subscription was started at Ichang for a monument to Captain Plant's memory. The response was immediate. Gunboat officers, masters of merchantmen, pilots, Chinese merchants, foreign civilians, and Chinese friends gave freely and an oversubscription resulted. The bungalow was taken down and removed, and in its place a slender, gleaming white stone shaft now arises. On the down-river side—the direction from which the foreigners came—is an inscription in English. On the up-river side is the same inscription in Chinese.

But even without the monument the memory of Captain Plant would perdure along the Upper River, for he will be a lasting tradition. Only a few of the old skippers who knew him are still operating in the gorges. But today, in the midst of the tense struggle of a straining ship up the roaring Hsintan, the hand of the master sometimes reaches involuntarily for the whistle cord and to his mind comes the vision of the kindly, white-haired, elderly man who was always ready with his benevolent advice and paternal interest—Captain Plant, the pilot of the Upper Yangtze.

U.S.S. *MINDANAO* AT FOOCHOW, CHINA

Courtesy Navy Department

Courtesy Lieutenant Commander Glenn Howell, U.S. Navy

HSINTAN, THE WORST RAPID OF THE YANGTZE GORGES

Captain Plant's bungalow stood upon the top of the dark hill to the left and above the center of the photograph.

Courtesy Lieutenant Commander Glenn Howell, U.S. Navy

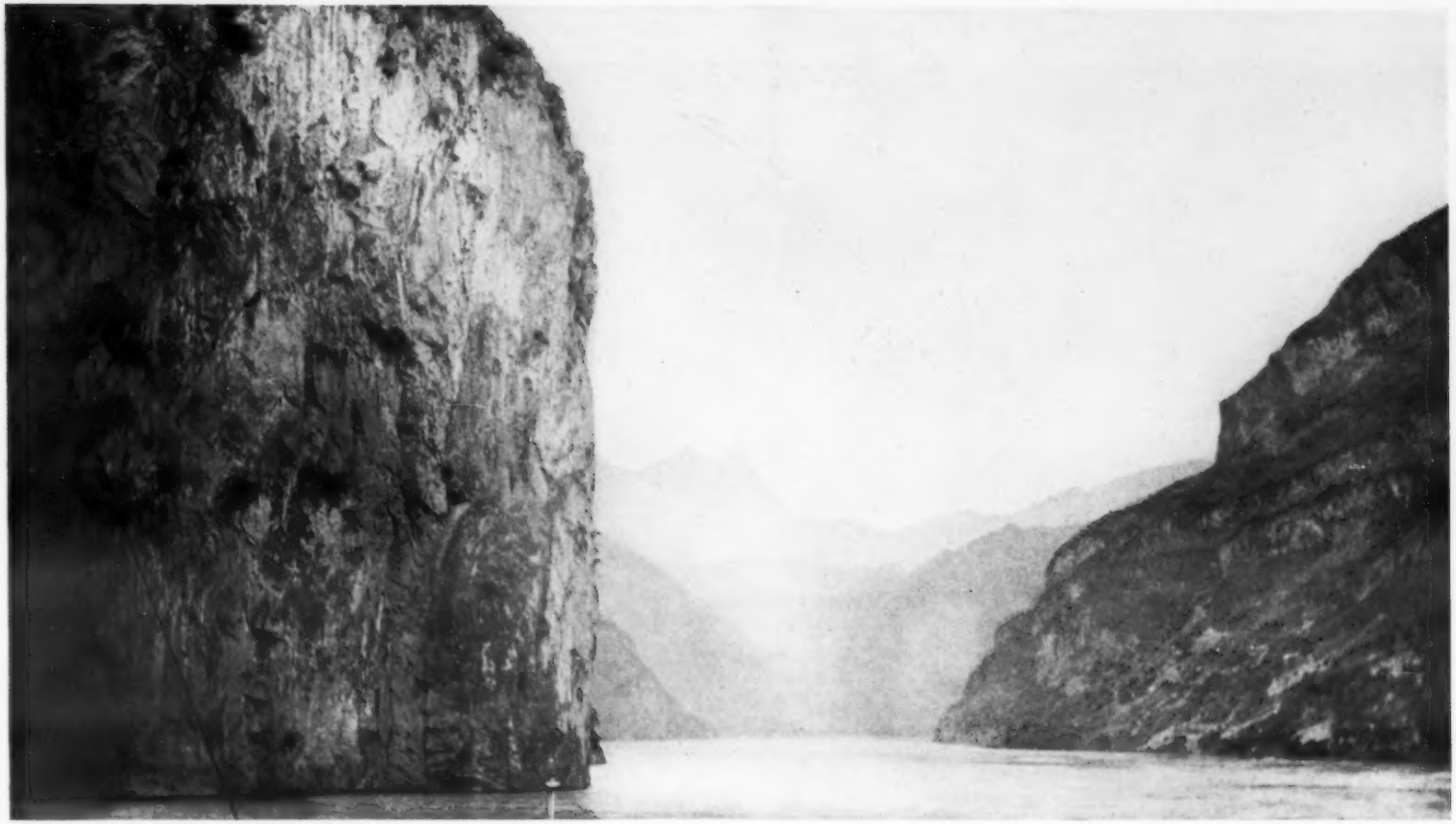
HSINTAN, THE WORST RAPID OF THE YANGTZE GORGES

Captain Plant's bungalow stood upon the top of the dark hill to the left and above the center of the photograph.

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

UPPER END OF MEITAN GORGE, LOOKING DOWN RIVER

Naval officers on the China Station found a knowledge of the Yangtze to be very useful.



Courtesy Commander D. M. Wood, U.S. Navy (Retired)

OX LIVER AND HORSE LUNGS GORGE—LOOKING UP RIVER

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

UPPER ENTRANCE WIND BOX GORGE—LOOKING DOWN RIVER

Mountain to left 4,500 feet high; current 17 knots. Note small village in right foreground close to water.

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

THE WALLS OF YUN YANG—LEFT BANK

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

A LUMBER RAFT OPPOSITE CHUNG KING
Which makes piloting more difficult.

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

ELBOW RIGHT-ANGLE TURN, WUSAN GORGE

Some of our naval officers have qualified as Yangtze River pilots but not on this part of the river. Only one white man, Captain Plant, ever became a pilot for the gorges.

Courtesy Commander D. M. Wood, U.S. Navy Retired)

PAGODA ON RIGHT BANK BELOW TOWN OF WUCHANG

Courtesy Commander D. M. Wood, U. S. Navy (Retired)

A SIDE CANYON—WUCHANG GORGE

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

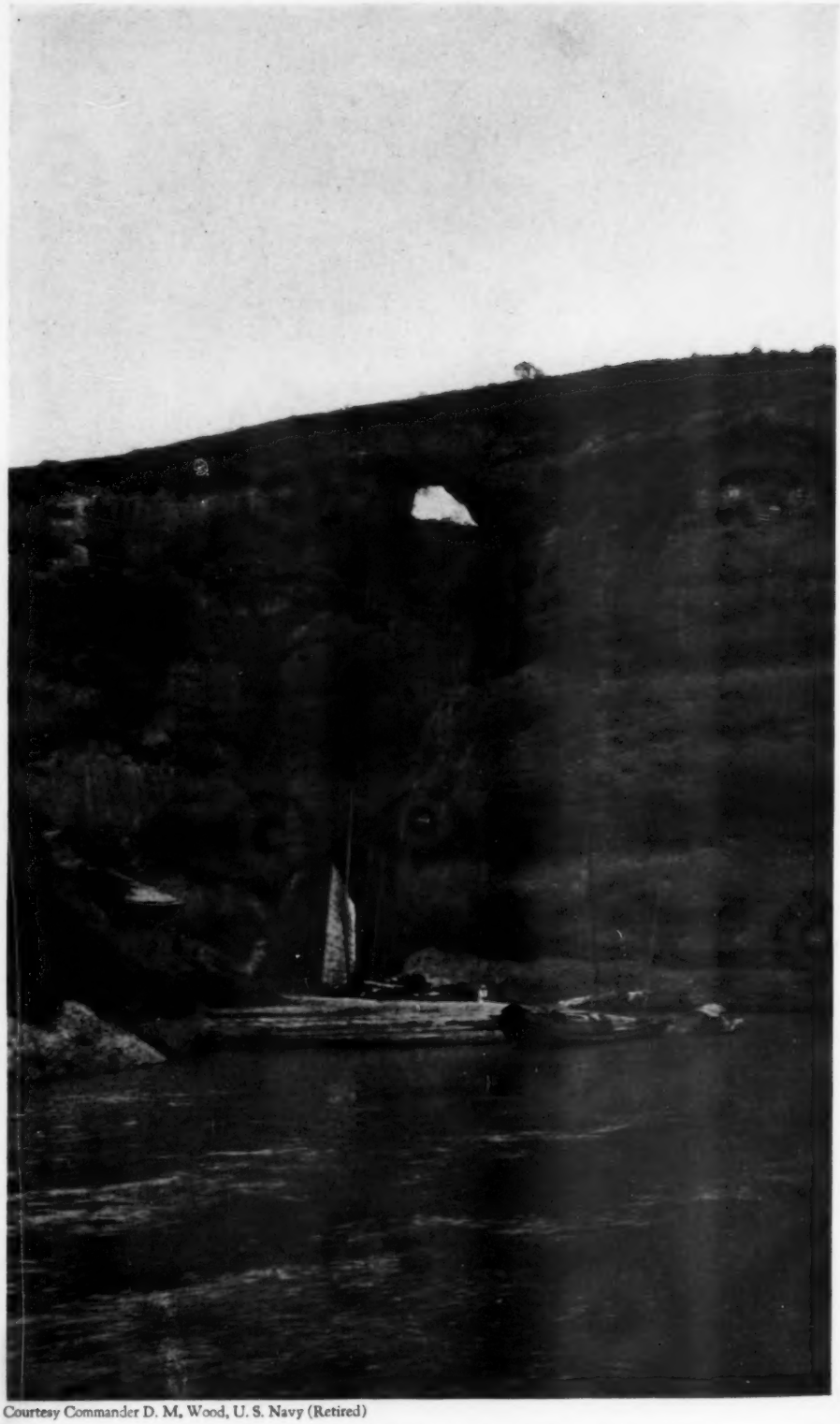
SHASI—PAGODA AND JUNKS

Courtesy Commander D. M. Wood, U.S. Navy (Retired)

LOWER END OF WUSHAN, A CITY IN WUSHAN GORGE.

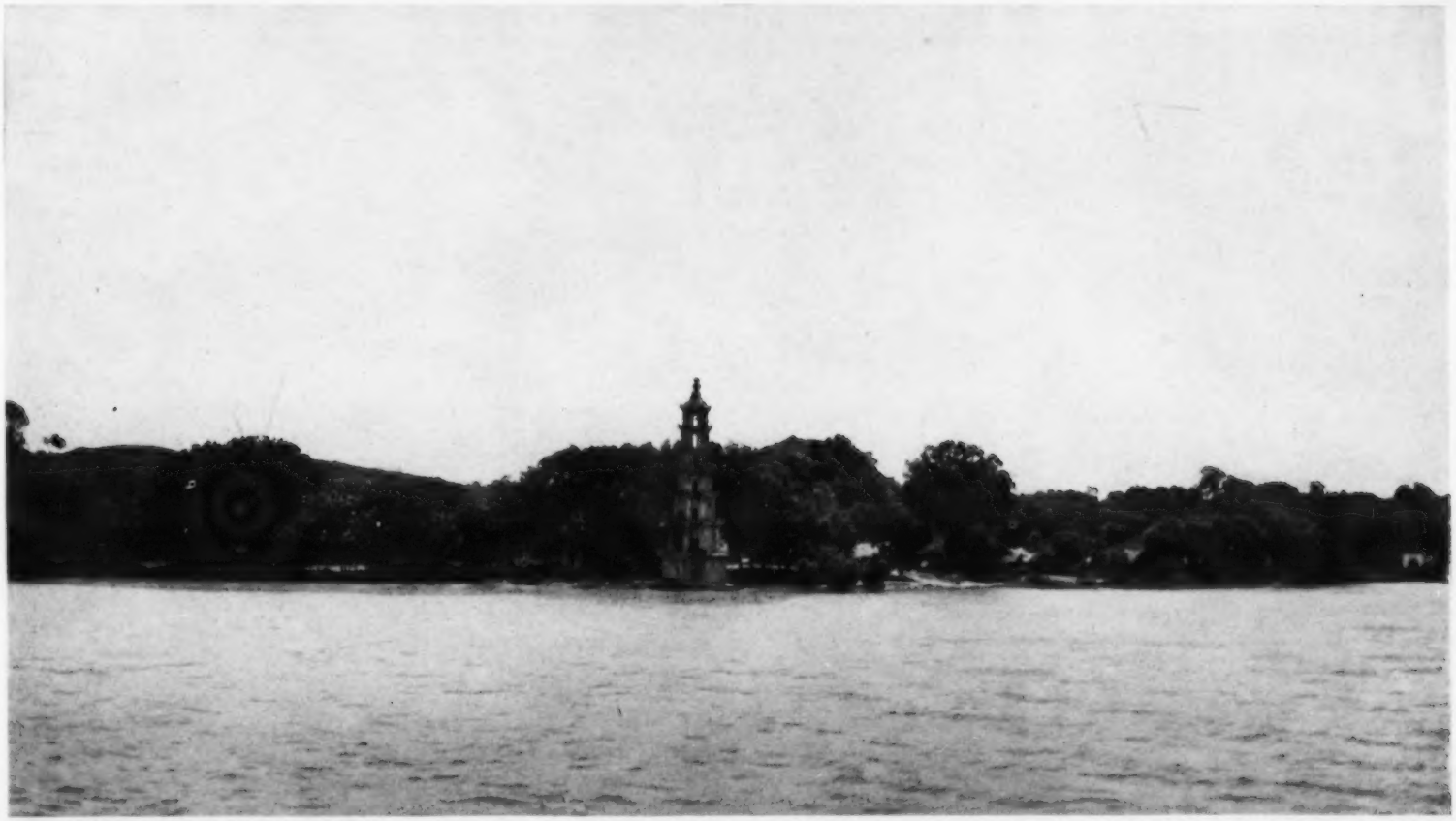
Courtesy Commander D. M. Wood, U.S. Navy (Retired)

PING SHANPA—ICHANG GORGE—A TEMPLE AND SETTLEMENT



Courtesy Commander D. M. Wood, U. S. Navy (Retired)

YANGTZE—NATURAL BRIDGE—JUST BELOW ICHANG ON RIGHT BANK



Courtesy Commander D. M. Wood, U.S. Navy (Retired)

SIANG RIVER—PAGODA BELOW BENDS

Courtesy Commander D. M. Wood, U.S. Navy(Retired)

ICHANG GORGE—ELBOW—DOWN RIVER

Historic Ships *of the* Navy

By ROBERT W. NEESER

Ranger

THE first *Ranger* was an eighteen-gun ship built at Portsmouth, New Hampshire, in 1777. She was a sailing vessel of 308 tons burthen; 116 feet length over all; 28 feet breadth; and 13 feet 6 inches depth of hold. She was pierced for twenty-six guns, but she proved so very cranky that it was decided to mount only eighteen six-pounders. The crew consisted of 140 men.

Captain John Paul Jones was ordered to command the *Ranger* on June 14, 1777, but interminable delays and difficulties were experienced in fitting out the ship, and the fall was far advanced before the first set of sails was delivered at the shipyard. On November 1, everything was ready and the *Ranger* set sail on her first cruise, carrying the news of Burgoyne's surrender to Europe. "I will spread this news in France in thirty days," wrote Captain Jones, and on December 2 he fulfilled his promise by anchoring off Nantes, France. Leaving the *Ranger* in charge of his first lieutenant, who was also given the task of disposing of two prizes which had been taken during the passage over, Captain Jones hastened to Paris, where he communicated to the American commissioners the dispatches of the Secret Committee of Congress.[1]

During his visit to the French capital, which lasted several months, Captain Jones spent much time conferring with Dr. Franklin about the cruise of a French fleet to America and his own immediate project of harassing the British on their own shores. Early in February, 1778, he returned to his ship, which had been thoroughly refitted, and dropped down the Loire to Quiberon Bay. There he met a French fleet commanded by Admiral La Motte Picquet. Captain Jones at once entered into negotiations with the latter regarding an exchange of salutes, and on February 22 he had the satisfaction of writing to the Marine Committee as follows:

> The American flag [has been] for the first time recognized in the fullest and completest manner by the flag of France. I was off their bay the thirteenth and sent my boat in the next day to know if the admiral would return my salute. He answered that he would return to me, as the senior American continental officer in Europe, the same salute which he was authorized by his court to return to an admiral of Holland or of any other republic, which was four guns less than the salute given. I hesitated at this, for I had demanded gun for gun. Therefore I anchored in the entrance of the bay, at a distance from the French fleet; but after a very particular inquiry on the fourteenth, finding that he had really told the truth, I was induced to accept his offer, the more so as it was in fact an acknowledgement of American independence. The wind being contrary and blowing hard, it was after sunset before the *Ranger* got near enough to salute La Motte Picquet with thirteen guns, which he returned with nine. However to put the matter beyond a doubt, I did not suffer the *Independence* to salute till the next morning, when I sent the admiral word that I should sail through his fleet in the brig and would salute him in open day. He was exceedingly pleased and returned the compliment also with his nine guns.[2]

From Quiberon Bay, the *Ranger* went to Brest, where she anchored on March 8. A few days later she exchanged salutes with Admiral d'Orvillier's fleet which was anchored in the harbor, receiving eleven guns in return for thirteen. After this Captain Jones proceeded to carry out his plan of a cruise in British waters. He sailed from Brest on April 10, and four days later made his first prize between Scilly and Cape Clear. On April 17 off Dublin, Ireland, a ship was captured and sent back to France in charge of a prize crew.

[1] He had hoped to be the first to bear the glorious tidings of the victory at Saratoga, but he was forestalled by a special messenger who had taken passage in a swift packet.

[2] Captain Jones to the Marine Committee, February 22, 1778.

On the same evening, the *Ranger* stood over towards the Isle of Man with the intention of making a descent upon Whitehaven. At 10 P.M. she was off the harbor, ready to land a party of volunteers, but the wind suddenly shifted and threatened to blow the ship on shore, so that expedition had to be given up and all sail made to clear the land.

Adverse winds now obliged the *Ranger* to keep the open sea for several days, during which a revenue cutter was chased and two coasting vessels were sunk. On April 21 near Carrickfergus, Ireland, a fishing boat came off to the ship and from its crew Captain Jones learned that the British ship-of-war *Drake,* twenty guns, was anchored in the harbor. The events which followed are perhaps best described in the captain's own words:

I determined to attack [the *Drake*] in the night; my plan was to overlay her cable, and to fall upon her bow, so as to have all her decks open and exposed to our musquetry, etc.; at the same time, it was my intention to have secured the enemy by grapplings, so that, had they cut their cables, they would not thereby have attained an advantage. The wind was high, and unfortunately the anchor was not let go so soon as the order was given, so that the *Ranger* was brought to upon the enemy's quarter at a distance of half a cable's length. We had no warlike appearance, of course had given no alarm; this determined me to cut immediately, which might appear as if the cable had parted, and at the same time enable me, after making a tack out of the Lock, to return with the same prospect of advantage which I had at the first. I was, however, prevented from returning, as I with difficulty weathered the lighthouse on the lee side of the Loch, and as the gale increased. The weather now become so very stormy and severe, and the sea ran so high, that I was obliged to take shelter under the south shore of Scotland.

The twenty-second introduced fair weather, though the three kingdoms were, as far as the eye could reach, covered with snow. I now resolved once more to attempt Whitehaven; but the wind became very light, so that the ship would not in proper time approach so near as I had intended. At midnight I left the ship with two boats and thirty-one volunteers; when we reached the outer pier, the day began to dawn; I would not, however, abandon my enterprise, but despatched one boat under the direction of Mr. Hill and Lieutenant Wallingsford, with the necessary combustibles to set fire to the shipping on the north of the side of the harbor, while I went with the other party to attempt the south side. I was successful in scaling the walls and spiking up all the cannon on the first fort; finding the sentinels shut up in the guardhouse, they were secured without being hurt. Having fixed sentinels, I now took with me one man only (Mr. Green) and spiked up all the cannon on the southern fort, distant from the other a quarter of a mile.

On my return from this business, I naturally expected to see the fire of the ships on the north side, as well as to find my own party with everything in readiness to set fire to the shipping on the south; instead of this, I found the boat under the direction of Mr. Hill and Mr. Wallingsford returned, and the party in some confusion, their light having burnt out at the instant when it became necessary.

By the strangest fatality, my own party were in the same situation, the candles being all burnt out. The day too came on apace, yet I would by no means retreat while any hopes of success remained. Having again placed sentinels, a light was obtained at a house disjoined from the town, and a fire was kindled in the steerage of a large ship, which was surrounded by at least a hundred and fifty others, chiefly from two to four hundred tons burthen, and lying side by side, aground, unsurrounded by water.

There were, besides, from seventy to a hundred large ships in the north arm of the harbor, aground, clear of the water, and divided from the rest only by a stone pier of a ship's height. I should have kindled fires in the other places if the time had permitted; as it did not, our care was to prevent the one kindled from being easily extinguished. After some search, a barrel of tar was found, and poured on to the flames, which now ascended from all the hatchways. The inhabitants began to appear in thousands, and individuals ran hastily towards us. I stood between them and the ship on fire, with a pistol in my hand, and ordered them to retire, which they did with precipitation. The flames had already caught the rigging, and began to ascend the main mast; the sun was a full hour's march above the horizon, and as sleep no longer ruled the world, it was time to retire. We reëmbarked without opposition, having released a number of prisoners, as our boats could not carry them. After all my people had embarked, I stood upon the pier for a considerable space, yet no person advanced; I saw all the eminences round the town covered with amazed inhabitants. . . . . Had it been possible to have landed a few hours sooner, my success would have been complete. Not a single ship, out of more than two hundred, could possibly have escaped, and all the world would not have been able to save the town. What was done, however, is sufficient to show, that not all their boasted navy can protect their own coasts; and that the scenes of distress, which they have occasioned in America, may be soon brought home to their own door.[3]

After this Captain Jones stood over to St. Mary's Isle, on the Scotch coast, where he went ashore with a boat's crew. Here was the estate of the Earl of Selkirk, whom it was planned to carry off, to serve as a hostage for the better treatment of American prisoners in England. The design was frustrated, however, by the absence of the

[3] Sands' *Life and Correspondence of John Paul Jones,* p. 80-83.

earl from the castle, but the sailors accompanying Captain Jones, refusing to return to their ship empty handed, demanded the privilege of bringing away some booty from the estate. The permission was unwillingly granted, and they took a quantity of the family plate which was delivered to them. Captain Jones subsequently purchased the plate at his own expense, and returned it to the Earl of Selkirk, from whom he received full acknowledgement.[4]

The entire coast was by this alarmed of the presence of the *Ranger* and several cruisers were searching for her, but still Captain Jones lingered off the North Channel in the hope of meeting one of the British ships in single combat. On April 24, he ran over to Carrickfergus to see whether he could not induce the *Drake* to come out. As soon as the *Ranger* appeared off the harbor, a boat was seen coming towards her. Surmising that the officer in the stern sheets was trying to ascertain his force, Captain Jones very skillfully kept the ship's stern towards the boat, so that the enemy was unable to see her broadside. On coming within hail, the boat was decoyed alongside, and when the officer reached the quarterdeck great was his surprise to find himself a prisoner.

The *Drake* with wind and tide both against her, worked out of port slowly, so that it was nearly sundown when she got within hail of the *Ranger*. Both vessels were before the wind, standing to the northward, with a very light breeze and a smooth sea. Having led the enemy into mid-channel, in plain view of the three kingdoms, Captain Jones hove to, ran up "the American stars on board the *Ranger*," while the *Drake* displayed British colors. "The action was very warm, close and obstinate," wrote Captain Jones in his report. "It lasted an hour and four minutes, when the enemy called for quarter, her fore and main topsail yards being both cut away and down on the cap, the top-gallant yard and mizzen-gaff both hanging up and down along the mast, the second ensign which they had hoisted shot away, and hanging on the quarter-gallery in the water, the jib shot away and hanging in the water, her sails and rigging entirely cut to pieces, her masts and yards all wounded and her hull also very much galled." On board the *Ranger* were two men killed and six wounded; the British admitted forty-two casualties.

After repairing and manning his prize, Captain Jones continued his cruise around the west coast of Ireland. A large brigantine laden with naval stores was taken off Malin Head, and then the *Ranger* shaped her course for the French coast, arriving at Brest with her prizes on May 8.

Captain Jones was now detached in order to give him a larger ship, the command of the *Ranger* devolving upon Lieutenant Thomas Simpson (July 27, 1778). The latter brought the vessel back to the United States in the fall, reaching Portsmouth, New Hampshire, in company with the *Providence* and *Boston* on October 15, having taken three prizes on the passage from France.

As soon as the *Ranger* could be refitted, she left for Boston, Massachusets, February 24, 1779, joining the *Warren* and *Queen of France* in Nantuket Roads. The three vessels made a cruise on the Atlantic coast, but they met with little success at first. Early in April, however, they had the good fortune to fall in with a large convoy from which they succeeded in cutting out seven ships, all of which were brought into port safely.

On June 18 the *Ranger* went to sea again in company with the *Providence* and *Queen of France*, with orders to cruise to the eastward. The log of the *Ranger* records the capture of two Jamaicamen in July, and not long after the American vessels fell in with a convoy of 150 ships near the Banks of Newfoundland in a dense fog. Nothing could be seen, but the sound of ships' bells and signal guns indicated the presence of many vessels. The *Ranger* suddenly found herself alongside a large ship, which proved to be the *Holderness*, a three-decker mounting twenty-two guns.

She struck, after giving her several broadsides. Although she had more guns and those of heavier metal than ourselves, her crew was not sufficiently large to manage her guns and at the same time work the ship. She was loaded with cotton, coffee, sugar, rum, and allspice. While we were employed in manning her, our commodore captured another and gave her up to us to man also. When this was accomplished it was nearly night; we were, however, unwilling to abandon the opportunity of enriching ourselves, therefore

[4] For the correspondence exchanged between Captain Jones and the Earl of Selkirk, see Sands' *Life and Correspondence of John Paul Jones*, p. 89-101.

kept along under easy sail. Some time in the night we found ourselves surrounded with ships and supposed we were discovered. We could distinctly hear their bells, on which they frequently struck a few strokes, that their ships might not approach too near each other during the night. We were close on board one of their largest armed ships and from the multitude of lights which appeared, supposed that they had called to quarters. . . . . The next day the sky was overcast and at times we had a thick fog. In the afternoon the sun shone for a short time and enabled us to see a numerous fleet a few miles to windward, in such compact order that we thought it best not to approach them. We were, however, in hopes that we might pick up some single ship. We knew nothing of our consorts, but were entirely alone. Towards night we took out and manned a brig. On the third morning we gained sight of three ships, to which we gave chase and called all hands to quarters. When they discovered us in chase, they huddled together, intending as we supposed to fight us. They however soon made sail and ran from us; after a short lapse of time we overhauled and took one of them, which we soon found to be a dull sailer. Another, while we were manning our prize, attempted to escape, but we soon found that we gained upon her. While in chase a circumstance occurred which excited some alarm. Two large ships hove in sight to windward running directly for us under a press of sail. One of them shaped her course for the prize we had just manned. We were unwilling to give up our chase, as we ascertained from our prize that the two other ships were . . . . unarmed. We soon came up with the hindmost, brought her to and ordered her to keep under our stern, while we might pursue the other, as our situation was too critical to allow us to heave to and get out our boat. The stranger in chase of us was under English colors; we however soon ascertained by her signal that she was the *Providence* frigate, on board of which was our commodore. This joyful intelligence relieved us from all fear of the enemy and we soon came up with our chase. . . . . We now ascertained that the strange ship, which was in chase of our first prize, was another of our consorts, the *Queen of France*.[8]

Three of the eleven prizes were afterwards recaptured, but the other eight, worth with their cargoes over a million dollars, were brought safely into Boston a month later.

In the fall of 1779 the *Ranger* was again fitted out by Captain Simpson for special service with Commodore Whipple's squadron. The vessels put to sea on November 23 and cruised to the eastward of Bermuda. Very heavy weather was encountered, and on the third day out the *Ranger* sprang her mizzenmast. But the real destination of the squadron was Charleston, South Carolina which was threatened by a British force, and thither all the vessels proceeded, anchoring off the town on December 23. The presence of the squadron seemed to reassure the garrison, for a fortnight later one of the officers wrote home that the "designs of the enemy (were) frustrated, as they had not attempted nor is it probable they will attempt anything against this town this season."

On January 24, 1780, the *Ranger* made a short cruise off the southern coast in company with the *Providence*. Three enemy transports laden with military stores were captured near Tybee, Georgia, where Captain Simpson discovered "a very considerable number of ships at anchor (five of them appeared to be above thirty-six guns) and a variety of smaller vessels." It was obvious that this force was being assembled for the purpose of making an attack upon Charleston, and the *Ranger* and her consort lost no time in hastening back with the news.

Preparations were at once made for the defense of the approaches to the city. The garrison in Fort Moultrie was reinforced, while the defenses on the land side were strengthened as far as possible. Naval cooperation was rendered difficult by the shallow water inside the bar, and there was unfortunately no anchorage from which the vessels of Commodore Whipple's squadron could command the channel with their broadsides. An attempt was made to obstruct the Cooper River, the *Ranger* and two galleys being stationed above the barrier. But the British lines gradually drew closer to the town, and on April 15 the log of the *Ranger* referred to the "constant cannonading" to which the defenders were being subjected. On May 7th Fort Moultrie was evacuated, and four days later General Lincoln surrendered the city. The *Ranger* fell into the enemy's hands, and was taken into the British Navy under the name of *Halifax*.

The second *Ranger* was an armed schooner purchased at Baltimore, Maryland, in March, 1814, for $500. She carried one long 18-pounder. There is no account of the service performed by this vessel. She was sold at Baltimore, Maryland, in 1816.

The third *Ranger* was a fourteen-gun brig purchased in 1814 for service on Lake Ontario. The official records contain no

[8] *Memoirs of Andrew Sherburne*, p. 21-23.

references to her activities other than that her name continued to figure in the Navy list until May 15, 1821, when she was condemned as unworthy of repairs.

The fourth *Ranger* was a "steam vessel of war, with auxiliary sail power" authorized by Congress on February 10, 1873. She was built by contract at the shipyard of Harlan and Hollingsworth, Wilmington, Delaware, where she was launched in 1876. She was classed as a third rate. The hull was of iron with the following dimensions: burthen, 541 tons; displacement, 1,020 tons; length, 177 feet 4 inches; breadth 32 feet; draft 12 feet 9 inches. The machinery was built by John Roach at Chester, Pennsylvania, and consisted of two-cylinder back-acting compound engines of 560 horsepower and forty-two inches stroke. Steam was furnished by four tubular return flue boilers. The speed was ten knots. The bunker capacity was 126 tons of coal. When first commissioned, the armament consisted of one 11-inch and two 9-inch smooth-bores, one 60-pounder rifle, and two light guns. In April, 1892, there were: one 60-pounder breech-loading rifle, one 8-inch muzzle-loading rifle, two 9-inch smooth-bores, one 3-inch breech-loader, and three rapid-fire guns. In May, 1899, she was given six 4-inch rifles, four 6-pounders, one 6-mm Colt automatic gun, and one field piece. The complement was twenty-one officers and 127 men.

The *Ranger* was placed in commission at the League Island Navy Yard, Pennsylvania, on November 27, 1876, by Commander H. De Haven Manley. She was attached to the North Atlantic station until March, 1877, when she was relieved and ordered to duty with the Asiatic Fleet. She left New York on April 19 and after an uneventful voyage reached Hongkong, China, late in August. Commander Robert Boyd joined the ship at Yokohama, Japan, on January 1, 1879, and kept her until the end of the cruise. The vessel was recalled home towards the end of the year and went into ordinary at Mare Island, California, on February 24, 1880.

While at the navy yard, the *Ranger* was fitted out for surveying duty, being refitted on January 18, 1881, by Commander John W. Philip. After a short cruise off the west coast of Mexico, she left for Central American waters, where she continued her surveys, which were interrupted from time to time by calls for the protection of American interests at various ports. In November, 1885, she undertook a survey of the coast of Lower California, upon which she was engaged for four years. Among the officers who commanded her during this period were Commander Charles E. Clark (October 6, 1883), Commander F. A. Cook (October 14, 1886), and Commander George C. Reiter (October 16, 1889). Under Commander George E. Wingate (November 6, 1890), she cruised with the Pacific squadron for about a year, affording protection to American citizens in Central America. She was placed out of commission at Mare Island, California, on September 14, 1891.

A new commission dates from April 26, 1892, with Commander Henry E. Nichols in command. This cruise lasted three years, during which the *Ranger* operated with the Pacific squadron, her activities including the protection of the seal fisheries in Bering Sea and watching over American interests in Central America. Commander Edwin Longnecker was ordered to her in November, 1892, but he kept her only a year and then turned her over to Commander Eugene W. Watson (December 1, 1894); the latter placed the ship in ordinary on December 24, 1895. For four years the *Ranger* remained idle at Mare Island, California. Then she made another surveying cruise on the Californian coast under Commander Wells L. Field (November 4, 1899), Commander Horace W. Harrison (October 16, 1901), and Commander William P. Potter (November 11, 1901). In July, 1902, she visited the Isthmus of Panama for the purpose of assisting in the maintenance of order, after which she made an extended cruise in company with the Pacific squadron before going out of commission at Bremerton, Washington, on June 11, 1903.

Two years later, the *Ranger* was refitted for the last time. She left Puget Sound, Washington, on April 16, 1905, under Commander Edwin H. Tillman (March 30, 1905) for the Asiatic station. After a few months she was laid up at Cavite, Philippine Islands, where she remained in ordinary until the summer of 1908, when Commander William R. Rush (August 10, 1908) was ordered to bring her home by way of the

Suez Canal. On her arrival at Boston, Massachusetts, in November, the *Ranger* was decommissioned and transformed into a nautical schoolship. She was loaned to the State of Massachusetts on April 26, 1909, replacing the *Enterprise*. Her name was changed to *Rockport* on October 30, 1917, and later again to *Nantucket* (February 20, 1918), in order to avoid confusion with other vessels of the same name subsequently added to the Navy list.

The fifth *Ranger* was a mine sweeper chartered during the World War. She was a single-screw steam vessel at 213 gross tons, launched at New London, Connecticut, in 1882. The dimensions of the hull were: length, 137 feet 5 inches; breadth, 21 feet 2 inches; draft, 9 feet 6 inches. She had vertical single engines of 180 horsepower and one marine boiler. The speed was ten knots. The crew numbered twenty-two men. The vessel appears to have been employed on distant service during the war, after which she was returned to her owners, January 10, 1919.

The sixth *Ranger* was a battle cruiser of the first line authorized by the Act of Congress approved August 29, 1916. The designs called for a steel-armored vessel of 43,500 tons displacement; 650 feet length; 101 feet 8 inches breadth; and 31 feet draft. The propelling machinery consisted of General Electric turbines of 180,000 horsepower, driving quadruple screws, and there were sixteen oil-burning boilers. The designed speed was over thirty-three knots. The main armament consisted of ten 14-inch breech-loading rifles mounted in four turrets placed on a center line. The secondary battery included sixteen 6-inch rifles, four 3-inch antiaircraft guns, and eight 21-inch torpedo tubes. The complement was 1,500 officers and men.

The keel of the *Ranger* was laid at the Philadelphia Navy Yard, Pennsylvania, on September 25, 1920, but previous to that date her name was changed to *Constitution* (December 10, 1917).

The seventh *Ranger* was a steel battle cruiser of 43,500 tons laid down under the terms of the Act of August 29, 1916. Her characteristics were similar to those of the vessel just described. She was originally borne on the Navy register as the *Lexington*, her name being changed to *Ranger* on December 10, 1917, by order of the Navy Department. The contract for her construction was allotted to the Newport News Shipbuilding Company on March 24, 1917, but before the keel could be laid the work on her was suspended by the signing of the treaty limiting naval armaments, which required her to be scrapped. She was sold on November 8, 1923, to the Steel Scrap Company for $10,666.66.

The Engineering Competition

By LIEUTENANT C. J. HARTER *(SC) U. S. Navy*

THE matching of wit against wit to reach the top of each class undoubtedly has been an enormous factor in making engineering performances of the U. S. Navy the envy of the forces afloat under other flags. It has had, moreover, an intangible effect in stimulating economy in our merchant marine. Economical naval practices are studied by the shrewd operator who desires to secure as much energy from a pound of coal or a gallon of oil as possible, because his profit is in direct proportion to the reduction of overhead and the maintenance of schedules.

Values now are recognized and respected which, in older days, often were ignored. Economy in fuel requires eternal vigilance against the forces of neglect and waste. But it is submitted that at the present time all major improvements and advances have become so standardized by repetition and practice that they are veritable landmarks; as familiar to the young ensign standing watch as to the fleet engineer. Gains have been capitalized by the relentless forces in the office of fleet training so that ships now resemble the bull being snubbed by the farmer, who takes in all slack and hangs on.

This condition has caused sharp minds and ingenious souls to turn to other methods of advancing the cause. When an enterprising engineer officer, figuring far into the night with his book of rules and only the illumination of his flashlight (because the generators have been shut down to save oil), arrives at the amazing conclusion that he can make a better score at twenty-seven knots than he can at seven knots, he immediately becomes obsessed with the idea that the only proper speed for all occasions is the aforesaid twenty-seven knots.

If his commanding officer be cognizant of the peculiar appeal which a commendatory letter makes to the selection board, it may not be difficult for him to find sound reasons for recommending twenty-seven knots under conditions which normally would not produce such a desire.

Again, when he finds that any changes in speed except on the even hour require him to average the revolutions for the entire hour—with resultant decrease in competitive values over what would have been realized on a steady speed for that period—he may be able to persuade the bridge to continue the most gainful speed from the competitive viewpoint to the end of the hour, even though the necessity for sustained high speed has passed.

Such practices are justified under the premise that "they are all doing it," but they are nevertheless malignant growths on the competitive system which undoubtedly cost the fuel budget some thousands of dollars annually and can be eliminated only by an impartial and concerted effort on the part of the higher administrative officers whose duty it is to maintain a proper balance and to see that the tail never wags the dog.

In happy contrast to such a situation may be pictured other artificialties which actually result in economies but unfortunately have their repercussion on other phases of naval administration. For example, if it be found that fuel consumption while the ships are backed is excessive over the allowance (and on turbine-driven ships it is inherently so), it may be possible to induce the bridge to carefully calculate the distance to the anchorage and so arrange matters that the engines will be stopped and the ship glide to a graceful (albeit protracted) standstill squarely over the designated "mark" without the necessity of backing the engines. Meanwhile, with careful management, it will be possible for the engineer officer to secure all boilers, and shut down his plant, so that when the blast of the bugle finally signifies to the waiting crew that the anchor at last has dropped to the deep, the throttleman may be seen at his regular parade on deck, bathed and refreshed.

Such tricks, however, as has been said, are now universal. They only advance the general level of the competition. It is in the auxiliaries that the greatest latitude now is offered for the exercise of that ingenuity which is essential to excellence in engineering competition. Assuming that the competitive allowance at anchor is based on usual ventilation, ample allowance for drinking, washing, and flushing water, adequate cooling of drinking water and refrigerator spaces, and the proper utilization of the ship's commissary appliances, it is immediately perceived by the discriminating engineer officer that any reduction in the consumption of fuel for these purposes will advance the score. The formula for a family feud is now in hand. The engineer officer feels that it is his sacred duty to reduce auxiliary expenditures to a minimum and if he be of the proper mettle, such minimum is always ZERO.

He and his assistants will go stealthily from compartment to compartment and turn off lights and fans. Even though the blower rheostats have been set on the mark which scientific accuracy has demonstrated represents the lowest current consumption compatible with sustained motion, they will shut the ventilation system down entirely on the slightest pretext. If the ship be fitted with an air-heated system for cold weather, they will don woolen socks and balbriggan wear and smile at the anaemic souls who want heat. They will tie little placards to every fresh-water outlet, meter each major activity, and prescribe the number of pints of water permissible for a shower.

These, however, are allowable stratagems which are not resented. But when pressure is brought on the supply officer to buy shore bread to save the electric load on the ovens, and to purchase shore ice to save the electric load on the refrigeration apparatus; when the ice machines are shut down at night while the stalwart frankfurter wilts and becomes covered with mould (notwithstanding the rapid freeze in the early watches of the morning); when the cook wonders why the beans will not soften and suddenly discovers that the zealous watch officer has shifted the galley from live steam to back pressure, not knowing that the admiral would disturb the fine balance of things by taking an unexpected hot tub; and the whole crew are mustered to hoist the whaleboat because the steam winch unfortunately uses steam—it is then that family ties break and the black gang feels the scorch of the fires of ambition.

Unless the commanding officer takes a firm stand—and it is a hard and thankless task for him if his ship be near the top of the competitive list—he will feel inclined to follow Pontius Pilate and wash his hands of the matter and give the engineer officer his way. It is then, on contact with others, that the crew realize the pity which is freely given to the personnel of "competition" ships, because of the petty economies practiced on the daily comforts and necessities of shipboard life which would make even a Scotchman cry, "For shame!"

The scuttle butt may spout steam (even though it is shut down each night at 10:00 P.M.), the flushing water may be reduced below the standard of sanitation, oil lamps may be lit (because kerosene is not as yet under the competition), and even voice tubes may be used so that the telephone switchboard may be shut down, but so long as the score is high, the engineer officer will go blithely on his way, with scorn for those who cannot share his enthusiasm.

The remedy for these excesses cannot be left to administrative action afloat so long as the standards are set in Washington. It would seem logical to provide compensation for marked variations in speed during an hour; to put a limit on high-speed runs which may not be exceeded except for cause; and to provide allowances for those exercises which are essential to smart seamanship and proper ship handling, else this phase of our naval life will become extinct.

As for auxiliaries, it would seem only proper to fix a minimum rather than a maximum allowance for the necessities of shipboard daily life which may be lowered only under penalty. There would then be every inducement to the engineer officer to provide adequate ventilation, sufficient flushing flow, cool drinking water, and liberal bathing facilities, the maximum use of the ship's commissary appliances and those labor-saving devices which are put on board ship for better performance with fewer men.

It is only through such restraints on the ingenious mind that the engineering competition ever will appeal whole heartedly to the entire crew, and the real economies inherent in the idea will be fully realized.

An Angle *of* Recruiting

By COMMANDER L. M. STEVENS, *U. S. Navy*

THERE is a great deal of literature on the higher technic of recruiting for the Navy. It waxes and wanes as we need more or fewer new men, and we have gotten so deep into it that one can find instructions from old recruiters on the most minute details, even to the importance of eating a hearty breakfast. In concentrating on such details there is a tendency to overlook the *raison d'être* of our recruiting service.

The Navy must induct and train a varying percentage of new men annually, and it is the duty of the recruiting service to get, or pick—depending upon who is talking—these new men. When the number required is great, the standard falls. The percentage of punishments rises, together with "kick-outs" and desertions, and for awhile there is great concern about the reason and remedy. Then the number of new men decreases and the Navy settles back with a sigh of relief until the next time.

There is no argument about what we want. We want the best enlisted material possible. To get such men it is necessary to really pick them from as great a number of applicants as possible. The ideal situation would be this: a waiting list of qualified applicants at every recruiting station, with each station functioning smoothly and unharassed, all together inducting under quota the exact number of new men needed by the Navy each day, week, or month.

The problem is how to bring about, or to approach, such a solution. Many large firms recruit their entire personnel by this plan from huge waiting lists. Some of these firms have their waiting lists made up entirely of applicants recommended by their employees. These firms can do this because they are good to work for and their employees try to get their friends in. The naval recruiting literature and statistics are dazzling, and, contrary, perhaps, to general belief, are absolutely accurate. But if the Navy is as good a career for the enlisted man as we claim, why don't we also have a huge waiting list?

Among others, two restrictions militate against this: our recruits must be only young, male, American citizens; and they must bind themselves to serve at any job wherever sent for four years. This last scares away many applicants. But, even so, our applicants are surprisingly few.

This may be partly due to a fundamental service misconception of what the recruiting service should be. If we thought of the recruiting service as an employment department, which it should be, instead of a sales department, we would realize that the problem of creating applicants is part of the task of the whole Navy.

Old recruiters realize how it is in practice. The problem of creating applicants is put up to the recruiting service. It is criticized and looked upon as a loafing job. Here is what an old recruiter, Lieutenant Commander J. O. Hoffman, says of the recruiter and recruits:

> He must go after them, pursue them, and run them to cover by the force of his personality until he makes them believe that his brand of goods is better than anything else on the market. He must entirely disabuse his mind of the assumption that his two years of recruiting duty are going to make him forget how to work, because he will work harder than he ever has in his life.

The recruiting officer and the individual recruiter stands or falls upon the quantity and quality of production. A limited complement, a meager money allowance, a very limited motor-vehicle allowance, and all the advertising matter he can get, constitute the equipment of a recruiting officer. In the use of these the most minute instructions have been worked out, and instead of being worked out from the viewpoint of the employment manager—as they should be—they have been worked out from the viewpoint of the sales manager, because they have to be. Anything which would further restrict the number of applicants, as for instance, a

six-year enlistment, would further emphasize the recruiter's position as a salesman instead of an employer. We wish the best recruit we can get, and the recruiter's job should primarily be a picker, instead of a "go-getter." But he is forced into the salesman's attitude by the lack of voluntary applicants.

Now, the recruiting officer gets an astonishingly small percentage of recruits who have had no contact at all with the Navy. Most applicants know some one in the Navy who gives them first-hand information, or a friend's friend was in the Navy once, or a fellow townsman. Young men write home to their friends the most intimate letters, and they go home from time to time, *especially* as soon as possible after enlistment. If they are happy, they give us the best form of advertising possible, i.e., word of mouth, all over the United States, and the production efficiency of a recruiting officer in any locality varies in direct proportion to the reputation and knowledge of the Navy which exists in that locality.

He is greatly hampered by adverse reports of harshness or ill-treatment in the Navy. The harm is done just the same when the reports are false or exaggerated. Here is a jolt one enthusiastic C.P.O. recruiter got in Philadelphia: He heard an ex-Navy man speaking in the most derogatory manner of the Navy to some of his prospective recruits, and following his usual methods, he approached him and said: "What kind of a discharge have you?" Instead of the expected bluff or evasion, he was taken aback by the following reply: "My discharge is honorable and just as good as you ever got. I've had eight years' service without a scratch on my record, and I'm a first-class petty officer. But all us short-timers were crowded onto that transport like cattle; when we got to the Receiving Ship they kept me two weeks overtime before I could get my discharge. If that's the way I'm to be treated, to hell with the Navy."

A few men like this make the recruiter's lot hard indeed. The "kick-outs" are always disgruntled, and the fewer we can get along with, the better it will be for the Navy. The fewer "kick-outs," the less knocking, therefore more applicants, better recruits, and fewer "kick-outs."

Obviously our men must be happy and satisfied if they are to voluntarily get their friends to apply for enlistment in such numbers that we always have a waiting list. Voluminous statistics and peppy morale talks crammed down a man's throat may silence him—they will not make him happy and satisfied. There are plenty of openings in the Navy for ambitious young men, but there is not always enough thoughtfulness, help and consideration for a man's wishes. For example, great numbers of men wait until after discharge to apply for some particular ship or station, rather than submit their requests on their own station. They evidently do this, often through the nearest recruiting officer, because they are then sure their request will be taken care of and reach the Bureau of Navigation.

Plenty of other incidents will suggest themselves to the minds of officers of experience. The millennium cannot be reached, but the burden of reaching for it depends on the whole Navy, and not alone upon the poor, down-trodden recruiting officer. If we can approach the millennium, however, we will have large waiting lists, our recruiting officers will be employment and not sales officers, an enlistment will then be a sought-after privilege, and our enlisted personnel will grow still better.

The commanding officer of a happy ship or station is the best recruiting officer we can possibly have. He is responsible not only for his own reënlistments, but for many, many first enlistments about which he never hears. And a happy ship is usually a better military unit. Fortunately it works both ways—instead of the military value being diminished, it is enhanced.

U.S. S. *Sirius*—Navy Cargo Ship

By COMMANDER FRED F. ROGERS, *U. S. Navy*

THERE is undoubtedly a good percentage of officers in the service who, from continuous duty on battleships, cruisers, destroyers and other combatant ships of the fleet, know little or nothing of the ships of the transport service, especially the *Sirius* and *Vega*, our two cargo ships. Many times I have been asked by officers who are supposed to have a good general knowledge of Navy ships, "Just what is the *Sirius* and what does she do?" This question is usually followed by, "Why does the Navy keep these ships in commission, robbing the merchant marine of this freight-carrying trade?" To answer these questions and to disseminate general information concerning these two ships the following data is given on what they are, what they do and how they do it.

The U.S.S. *Sirius* (Canis Majoris—Dog Star) was originally the S.S. *Saluda*, built for the U.S. Shipping Board by the American International Shipbuilding Corporation at their works at Hog Island, Pennsylvania, in 1918-19. The vessel was taken over by the Navy from the Shipping Board on December 10, 1921, and was commissioned as the U.S.S. *Sirius* on January 20, 1922, with a regular Navy crew but officered from the U. S. Naval Reserve Force. During June, 1922, regular Navy officers replaced the reserve officers.

The *Sirius* is of 11,450 tons displacement, 401 feet long and fifty feet beam, gross tonnage 5,784.32 and net tonnage 3,515. The main engine is a Curtis turbine built by the General Electric Company, designed to develop 2,500 nominal, or about 3,000 actual, horsepower at 3,234 R.P.M. The reduction gears are of the two-stage type, also built by General Electric. Standard full power is ninety R.P.M., equivalent to 11.5 knots per hour. Under normal cruising conditions three boilers with all burners going, that speed is maintained without difficulty and with light breezes astern and a smooth sea, 12 knots is not unusual. When fully loaded however, the speed maintained is about 11 to 11.3 knots. Head seas and wind reduce speed very quickly. The ship is an excellent sea boat, well designed, staunchly built, and in excellent material condition. She has one right-handed propeller. The complement consists of ten commissioned officers, three warrant officers and a crew of ninety-three enlisted personnel.

The ship is as originally designed except that lower number three hold has been converted into a fuel-oil tank and some changes made in living spaces for both officer and enlisted personnel. She now has a fuel capacity of 569,000 gallons of oil and 110,000 gallons of fresh water stowage, which, with a cruising speed of eleven knots or better, makes her well suited as a cargo vessel. The daily expenditure of oil rarely exceeds 9,000 gallons and of water 3,200 to 6,000 gallons, depending on the number of passengers carried. There are accommodations on board for six officer passengers and ninety enlisted men. During favorable seasons as many as 140 enlisted passengers have been carried and fourteen officer passengers, without good accommodation, however, and only because most of them desired to take advantage of the schedule to reach their destination.

The *Sirius* is a unit of the Naval Transportation Service, designated by the Department primarily for the transportation of Navy cargo between naval supply bases and navy yards. She is operated directly under the Chief of Naval Operations, through the commandants of the various naval districts. The mission of this service is to provide water transportation for as much naval and Marine Corps personnel, cargo and fuel, as is possible, at the least possible cost. In each naval district there is a port director who, acting for the commandant, has general supervision over operations (including port movements, berthing, loading, discharg-

ing and handling of ship's stores, material supplies and cargo, and bunkering), personnel (including inspections, changes in personnel and passengers), and material (including repairs by ship's force, navy yards, or private firms under cognizance of the various bureaus of the Navy Department).

Since going into commission as a Navy cargo ship the *Sirius* has made ten round trips to the West Coast, including one additional side trip to Pearl Harbor, three round trips to the West Indies and in addition several shorter trips between navy yards on the East Coast. In all she has steamed approximately 147,000 miles without an overhaul other than the usual period of one month a year for docking and routine repairs. A typical voyage would be as follows: September 1, 1926, sailed from Hampton Roads to Bremerton via Philadelphia, Brooklyn, Guantanamo Bay, Coco Solo, Balboa, San Diego, San Pedro, Mare Island; returning via the above ports, arriving in Hampton Roads February 8, 1927, having steamed 13,721 miles. Boston is only included in the itinerary when cargo warrants a stop there, as are also Charleston and Corinto, Nicaragua. The *Sirius* and *Vega* do not as a rule make the run to Honolulu nor to the Asiatic, these routes being covered by the *Chaumont* and *Henderson*. In addition to the regular run, however, a yearly trip to Alaska has been made by the *Vega* for the convenience of other government departments. The yearly steaming of the *Sirius* has shown an average of about 25,000 miles.

The number of days in each port depends on the amount of cargo to be handled and facilities available at the station for handling it. Some of the stations, for instance, can handle as much as 250 tons in a working day while others have difficulty in going as high as ninety tons. There are, however, several conditions which influence the time factor in cargo handling. These are: kind of cargo, facilities for handling, number of gangs and holds to be worked, weather conditions, and proper distribution of cargo.

The cargo carried embraces almost every kind and description from small cartons and packages to 14-inch and 16-inch guns, main boilers for battleships, pontoons for raising submarines, machinery of large dimensions and weight, gyros, small-arms ammunition, heavy shells, acids, CO_2, oxygen, acetylene gas and gasoline (articles which shipped commercially would be paid for at a much higher tariff than ordinary freight). The loading and unloading of many of these articles require the use of trained men and special equipment which the Navy has, and which would greatly increase the cost if handled by commercial firms. With the exception of New York and the Canal Zone, all freight is handled by navy yard employees.

Duty on a cargo ship will prove enlightening to most line officers in respect to the tons and tons of cargo it takes to keep the Navy going and as to the principal sources of supply, that is, the localities where most naval contracts are placed. Articles bought cheaper on the West Coast are transported to the eastern navy yards in the *Sirius* and *Vega*, and in a like manner the East furnishes many articles needed on the West Coast.

There has been from time to time much discussion in the Department and in the service generally, of the relative cost of keeping these two cargo ships in commission as compared to the cost commercially for similar service. Why should the Navy, which more than any other organization encourages and fosters a large peace-time merchant marine as a necessary auxiliary in time of war, keep in commission these cargo ships, when there are available so many American freight-carrying lines whose earning capacity would be increased by this trade and thus tend to keep more American bottoms in active service? The question, "Do they pay?" has been repeatedly raised recently and the Department has been able each time to show conclusively that they do more than pay their way in freight tariff saved. Navy cargo must be moved when and where needed and it has been the availability of these ships to move excess stock from one coast to the other at minimum expense and in good time, not to mention the officer and enlisted men passengers that must be transported between ship and shore stations, that has proven the worth of these ships to the Navy.

A unit of the fleet is undergoing overhaul at the Bremerton Navy Yard. Her 16-inch guns have been sent East for relining and replacements must be available so that she can be gotten out on time. It is difficult to estimate the cost of transporting these heavy guns, 14- and 16-inch, commer-

cially from coast to coast. It would practically amount to chartering the ship for the entire trip at a tremendous cost and then one might not be available when needed. It takes several days at a navy yard, and experienced riggers, to load such heavy weights and the hold in which they are stored must be completely emptied of other freight when the guns are put in. Such arrangements are very costly if undertaken commercially. Their transportation by rail carrier would be more expensive if not impossible. Large-caliber guns are only a sample of the pieces too large for either rail carrier or local steamers without having to pay on the basis of time charter which would run as high as $1,500 per day, depending on the character of cargo and the distance hauled. The *Sirius* has recently carried 8-inch double gun mounts for the *Saratoga* and *Lexington*, boilers for the *Arkansas* and *Florida*, thirty-ton pontoons used in raising the submarine *S-51*, and many other large and heavy pieces. With Navy cargo ships such service is available when needed and without additional cost. Another factor which should not be overlooked is that Navy and marine cargo is often urgently needed in ports outside the regular call of steamship lines, such as Guantanamo, Corinto, and Haitian ports. The Navy transport service has rendered very valuable assistance in keeping these stations supplied—service impossible to compute in dollars and cents.

From another angle, that of training officers and men during peace time in the highly important duties of the Naval Transportation Service, they are a valuable and necessary part of the Navy as a whole. Duty on these ships is valuable experience to officers assigned to them and should receive more favorable recognition throughout the service than is generally accorded it. To those officers who have not had their trick at it, the duty is looked on with disfavor as being non-professional and something to be avoided as long as possible. This is an entirely mistaken point of view and undoubtedly springs from an utter lack of knowledge of what these ships are and what they do. Besides giving very pleasant sea duty, they furnish excellent opportunities for the study and practice of seamanship and navigation, the handling of a good-sized single screw ship alongside docks and at sea in all kinds of weather, and the principles of proper loading and trim, together with the handling of heavy weights. The engineering plant is modern in every respect and presents the same problems in engineering, but on a smaller scale, as do most ship plants. There is engineering competition as in all other classes of ships. As far as the junior officers are concerned, they actually have more responsibility in their deck watches than they do on larger combatant ships. The supply officer has abundant duties in checking, receiving and discharging all the cargo handled by the ship. For the executive officer there are the usual problems of ship organization, receipt and transfer of many men, emergency drills and navigation. For the commanding officer it is an independent command directly under the orders of the Chief of Naval Operations. For the men it is regular work, uninterrupted by drills at unexpected hours, a regular schedule running throughout the entire year that takes them into the best ports on both coasts and that can be relied upon within very close limits. The loss professionally is in tactics and gunnery, and on this account, notwithstanding the fact that an occasional respite from the sound of the general alarm is good for the soul, it is believed that a year at a time in the transport service is all that should be required.

During the fiscal year 1926-27, the *Sirius* loaded and discharged 35,652 tons of cargo and transported 43 officer passengers and 432 troop-class passengers a distance approximately equal to the intercoastal trip. The ship's records show that during this period the ship actually loaded and transported 17,247 long tons. It is difficult to compute accurately the commercial cost of carrying this amount of freight because of the different rates in effect for various kinds of cargo and the variation in rates between ports. Some of the cargo, as stated above, if handled by an outside firm, would have cost on the basis of time charter at the rate of at least $1,500 per day for approximately twenty-five days if moved from one coast to another, and for a lesser number of days, if moved only between ports on the same coast.

For the purpose of estimating the commercial cost of carrying this amount a close analysis was made of one trip from East to

West Coast on the assumption that it was an average loading. During the fiscal year, the *Sirius* made two and one-half round trips. On all these, she was practically fully loaded, the average load being 3,458.64 long tons. Of an average load, it is found that about 88 per cent is coast-to-coast cargo, that is, cargo from any port on the East Coast to any port on the West Coast, including cargo to and from the Canal Zone ports and Guantanamo and Corinto. The remaining 12 per cent is coastal cargo—cargo for transportation between cities on the same coast. In approximating the commercial cost of carrying the average load, the load is divided into these two classes. Also, each class must be again subdivided into cargo of certain character as, for instance, general commodities, lumber, automobiles, household goods, gas, and special cargo of extra large size and weight.

In an analysis of the cargo carried by the *Sirius* on one trip, it was found that the cost for moving this same cargo commercially would have been $73,786.42.

During the fiscal year the *Sirius* made five such trips averaging the same amount and character of cargo. In addition, she carried 432 troop-class passengers for a distance approximately equal to the intercoastal trip, for whom transportation would have cost, at $80 per head, $34,560; and 43 officer passengers for the same distance at $170, average $7,310.

To recapitulate, the commercial costs for similar service would have approximated:

5 trips at $73,786.42	$368,932.10
Passengers carried	41,870.00
	$410,802.10

The cost of maintaining the *Sirius* in commission for the same period of time, including pay of officers and men of her complement — not passengers — provisions, fuel, all supplies issued and the amount spent by the Navy Yard, Norfolk, for repairs, together with the cost of stevedoring at yards, is as follows:

Ship's account	$237,090.51
Navy yard account.....	21,105.29
Stevedoring at yards—	
35,652 tons @ $1.00 per ton	35,652.00
	$293,847.80

The above figures show conclusively that the *Sirius* is paying her way to the following extent:

Total commercial charges	$410,802.10
Total operating costs ...	293,847.80
	$116,954.30

The above calculations for commercial charges must be understood to be the absolute minimum, as no time charter has been taken into account. Fourteen-inch guns, of which the *Sirius* carried fourteen, large pontoons, all ordnance material, heavy machinery, boats and all extra heavy and cumbersome pieces have been calculated at only double the general conference rate when, as a matter of fact, the commercial cost of transporting such cargo would be several times as great if, in fact, commercial firms could be induced to take them at all except on a basis of time charter. It is within easy limits to assume, then, if more accurate figures could be obtained, that the saving to the Navy in tariff charges by maintaining the *Sirius* in commission is close to $200,000 per year.

Cargo for these ships is assembled at the various navy yards and bases on both coasts and a weekly report of cargo, showing character and weight, awaiting shipment, is made to the Bureau of Supplies and Accounts. A copy of this report is forwarded to the government carriers and with this information, allowing for further receipts of cargo up to the time the ship will be ready to load, the ship makes out a schedule from the northernmost port of call on the Atlantic to Bremerton, Washington, taking in all ports at which cargo is to be received or discharged. This schedule is submitted to the Chief of Naval Operations for approval. As a general rule, the schedule is adhered to, but sometimes emergency conditions, such as bad weather, poor type of cargo or poor loading, arise which necessitate a change. However, the personnel of this branch of the transport service, knowing the conditions at each port so well and the general character of the cargo to be handled, can make out an itinerary that will meet the proper dates and provide enough, but not too much, time at each port.

Great importance is attached to the general plan of assigning the various holds of the ship to the different ports of call and the proper distribution of cargo within the holds.

Before arrival at each port, what is known as the cargo loading plan is made up by the executive, supply and cargo officers. In planning the distribution of cargo, it is not only important to segregate cargo for the different ports, but it must be so stowed as to be available for discharge at each port with the minimum movement of other cargo. The larger holds are generally allotted to ports for which the larger portion of cargo is assigned, and all cargo is placed so as to best trim the ship from the standpoint of seaworthiness and engineering efficiency. As a result of careful planning in advance, there is seldom any delay in unloading the cargo at any port, except where much deck cargo is carried on top of the hatches. This naturally must be moved twice in each port between its port of departure and its destination. Thus, an automobile or a boat, loaded as deck cargo in Boston for Bremerton, might possibly be landed nineteen times before finally reaching the dock in Bremerton.

The supply officer is responsible for the paper work such as bills of lading, reports of cargo on board and where consigned; also the ship checkers and the location of cargo. All cargo is covered by regular government bills of lading and is checked on board and out by both the ship and shore checkers. The ship can refuse to accept packages which are broken and cargo which could not receive proper stowage. Once on board, however, the ship is responsible until it is landed. One of the ship's officers is assigned the duty of cargo officer, and the securing of the cargo in the holds and on deck is personally supervised by him. He is assisted in this duty by the boatswain. The work itself is done by the outside force of stevedores, when time permits, and must be satisfactory to the ship. In heavy weather at sea, injuries may result from shifting cargo, but every effort is made in loading to prevent such a possibility. The heterogeneous nature of the cargo carried makes this a difficult job requiring ingenuity to sandwich lightly crated household goods between turbine generators, engine parts, or gun mounts, without serious damage resulting when the ship strikes the roaring forties north of Cape Mendocino. In case of injury to cargo in loading or discharging, the supply officer of the port is, as a general rule, responsible, as he is in charge of the stevedoring at most places. The ship furnishes expert winchmen if required.

One of the most common requests made of the *Sirius* is to unload cargo destined for one port at another port, which nine times out of ten is impossible to accomplish without rehandling two or three hundred tons of other cargo. This is especially so of household goods and automobiles. However, never a voyage is made without several such requests. In many instances, a change in destination of cargo would undoubtedly work to the convenience of the receiver and where possible such requests are complied with, but in the great majority of cases they are impossible to fulfill due to location of cargo in holds.

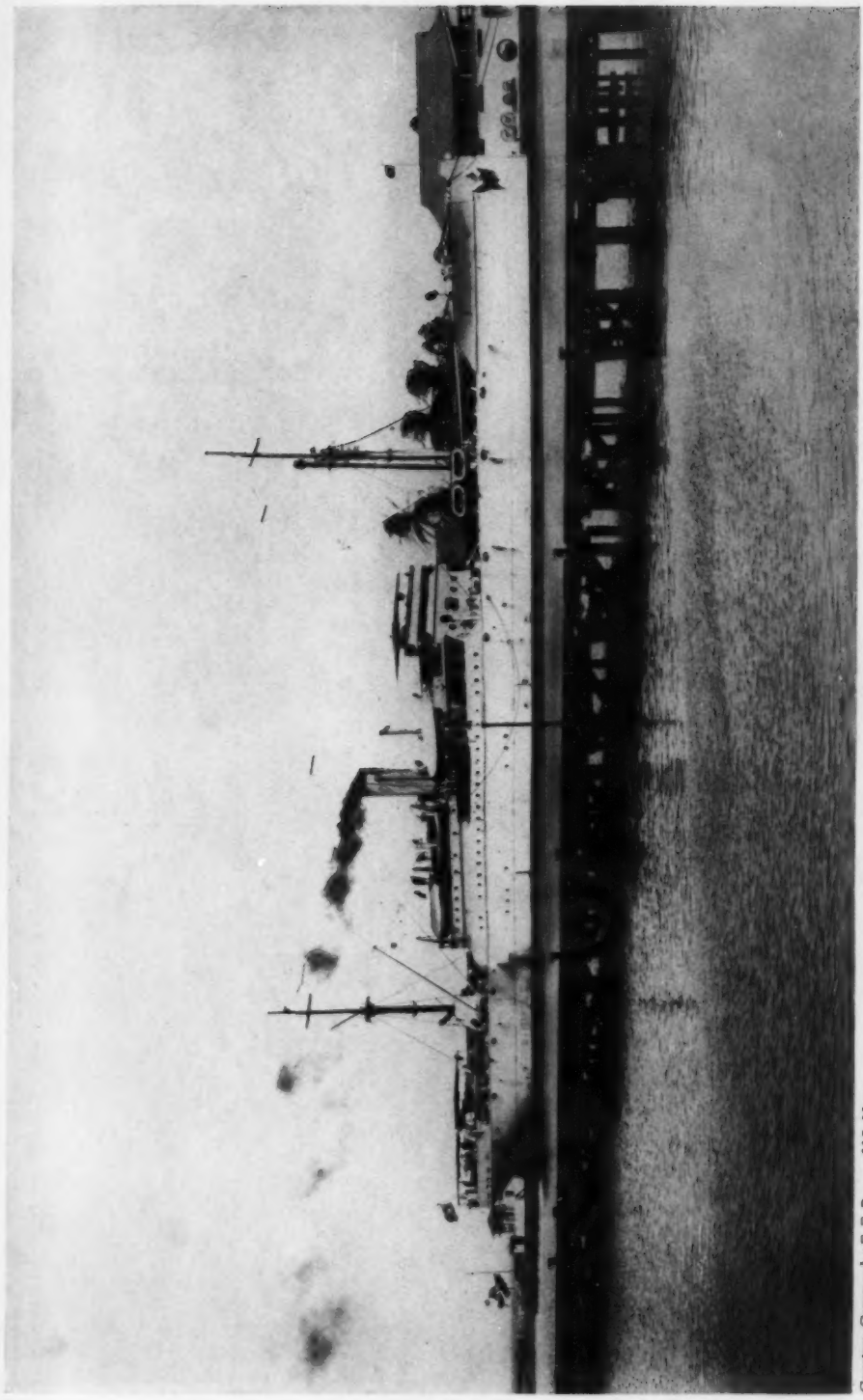
Practically no trouble is experienced on the *Sirius* due to broaching of cargo, or petty pilfering by the ship's crew, and very little by outside stevedores. This is due, largely, to the system in use in handling cargo, which provides for a representative of both ship and shipper being constantly on watch at each hatch that is in operation. These representatives also act as checkers. When, for any reason, it is necessary to keep a hatch open although not being worked, a sentry is always placed on watch, when the cargo is such as to encourage broaching. Where a sentry is not placed on watch, the hatch can be covered with a canvas tarpaulin which acts as a weather protection and also makes illegal entrance difficult without detection. Losses due to this cause are usually confined to canned goods and clothing and are believed to be much less than in the merchant service. Losses from broaching are promptly investigated and the facts logged for the use of the board of survey.

Other losses and misplacements of cargo are due either to over-carrying from one port to another, or to premature unloading. For these the responsibility is hard to place, unless the cargo has been checked in and out by separate pieces as indicated on the bill of lading. Under a temporary plan to speed up the loading and discharging of cargo, it is not at present checked by the separate piece and some inconvenience but not actual loss has resulted, as the pieces are nearly always eventually found. Such cases are apt to arise when the itinerary does not allow enough time to discharge and load without the necessity of overtime work.

Cargo may be classed generally as follows: (a) ordinary stores of the Naval Supply Account, which are being shipped from one navy yard or base to another, and which may or may not be checked by the individual items, depending on the nature of the stores; (b) precious cargo, such as delicate instruments, silverware, and alcohol, all of which is not only very carefully checked, but when space is available is locked up in the ship's own storerooms for safe-keeping; (c) special cargo such as 16-inch naval guns, boats, railway cars, derricks, etc., which the Navy Department desires moved from coast to coast; (d) last but not least important, household effects of Navy personnel. It is safe to say that more trouble is experienced with this last class of cargo than with all the others combined. Perhaps "trouble" is not the right word. Let us say "work and worry," because it is a very difficult thing to crate a miscellaneous assortment of household goods, very frequently containing flimsy furniture, and much glassware, then ship it three or four thousand miles in a ship's bottom, mixed with other heavier cargo, and expect it to arrive without a scratch. But officers do expect just that thing, and more, they expect scratches which were already on the furniture to be miraculously removed in transit. Special attention is paid to this type of cargo to insure its delivery in good condition and at the right place.

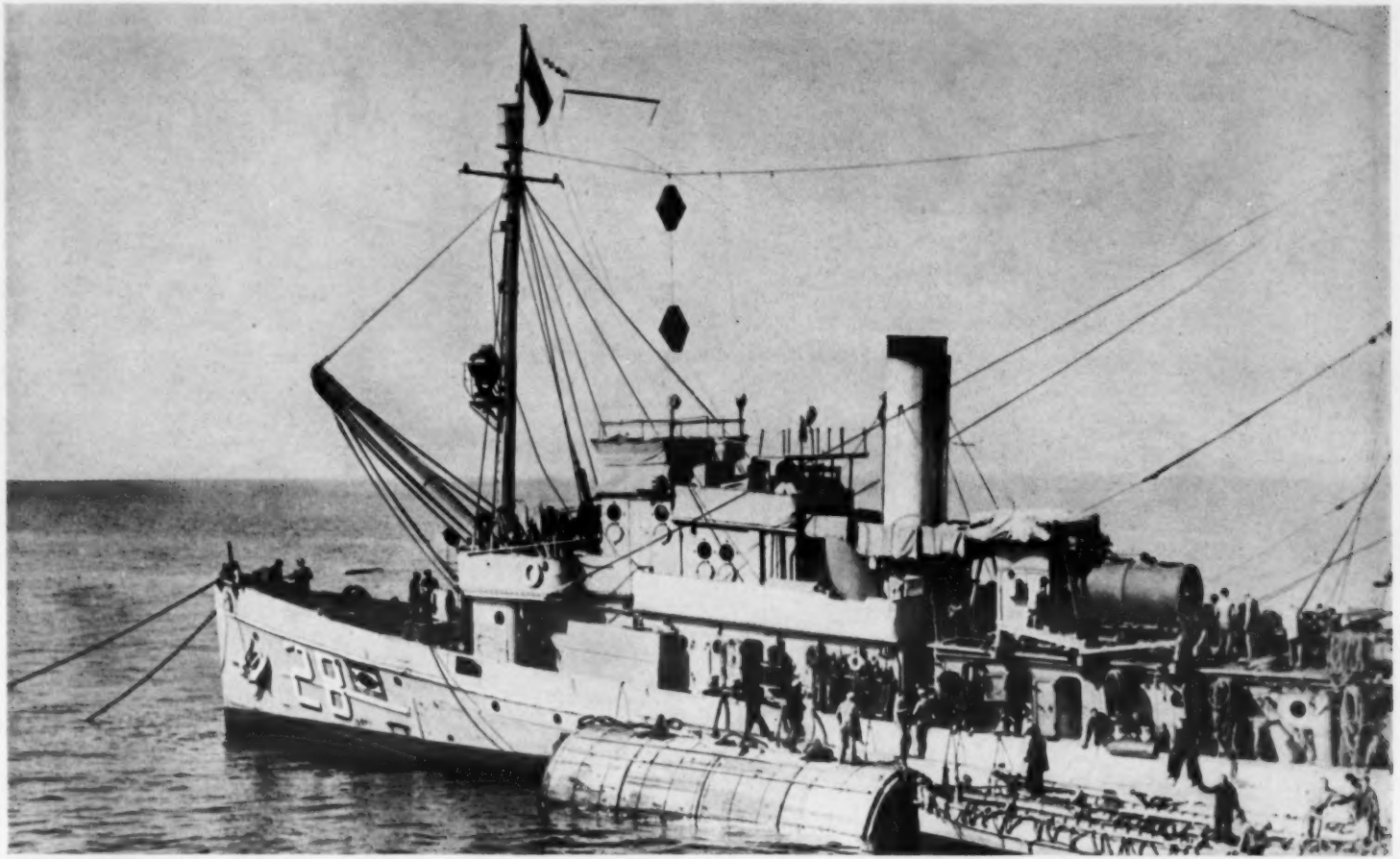
Another source of much anxiety to owners and a very sympathetic consideration on the part of the ship, is the private automobile. Nowadays, everyone has a car and the result is that when Lieutenant John Doe is ordered from Norfolk to San Diego, he finds only forty-eight cars ahead of him on the list waiting for a ship that has cargo space for about twelve. Now comes the tug of war. His problem is to get it on the ship, and he is willing to have it hung from a yardarm, just so it gets on board. But motor cars deteriorate considerably in a six-weeks' voyage if on deck in a leaky crate, insufficiently protected from the salt spray and tropical rains by old Navy tarpaulins. The result is that many requests are received from officers requesting individual attention for their automobiles, which would not only require shifting of cargo at sea and opening crates, but the services of men who cannot be spared from ship's work. It is also a painful fact that in the matter of automobiles much of the congestion is caused by the shipment of cars which are not worth the cost of crating. This is easily understandable when the shipment is from the East to the West Coast, but why anyone should ship an almost worthless car, from a market standpoint, from the West Coast to the East Coast is a puzzle, inasmuch as manufacturers permit dealers to accept a turn in on one coast and delivery from a factory branch on the other. There was recently a case where an officer, moving from East to West Coast, sought to sell his car. He was offered twenty-five dollars for it so he decided to have it crated and shipped on the *Sirius* to the West Coast. On the West Coast he was unable to get anything for it. A lot of fuel is consumed and valuable cargo space taken up by personal articles of practically no sale value.

After all is said and done, it is clear that the Navy's cargo ships not only pay their way in dollars and cents but render a service to the individual officer as well as the Navy as a whole. It is seldom that space cannot be found for the transportation of special items of personal interest from cord wood for the admiral's fire place to baby carts and toys for younger ones. Even if they *are* just "cargo ships," they can always give you the latest Navy news, be it from the fleet in the Pacific, the ships and bases on the Atlantic, or the marines in Nicaragua.



U.S.S. *SIRIUS* AT COCO SOLO DOCK

Courtesy Commander F. F. Rogers, U.S. Navy



International Newsreel

U.S.S. *FALCON* AND PONTOONS USED IN SALVAGING THE *S-51*

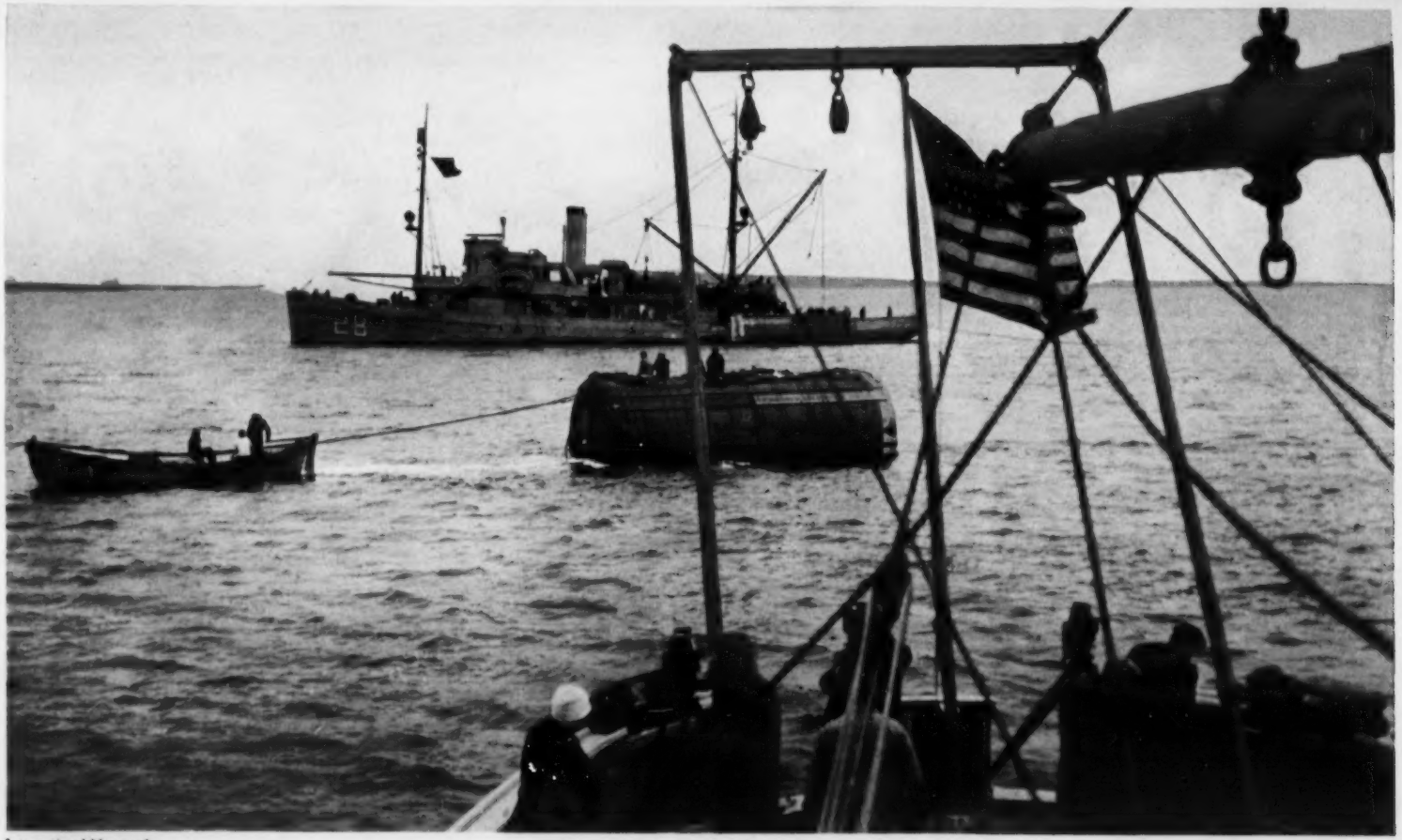
International Newsreel

THE *S-51* FINALLY RAISED

Pontoon bringing the *S-51* to the surface. The *S-50*, sister-ship, in the background. The operation of raising the *S-51* was ably described in a series of articles in the *Saturday Evening Post*, written by Lieutenant Commander Edward Ellsberg, one of the officers in charge of the operations.

International Newsreel

IN EAST RIVER
Towing the *S-51* to the Navy Yard, New York.



International Newsreel

CONDUCTING TESTS WITH RECONDITIONED *S-4*
Pontoon being placed to test efficacy of newly designed lifting rings.

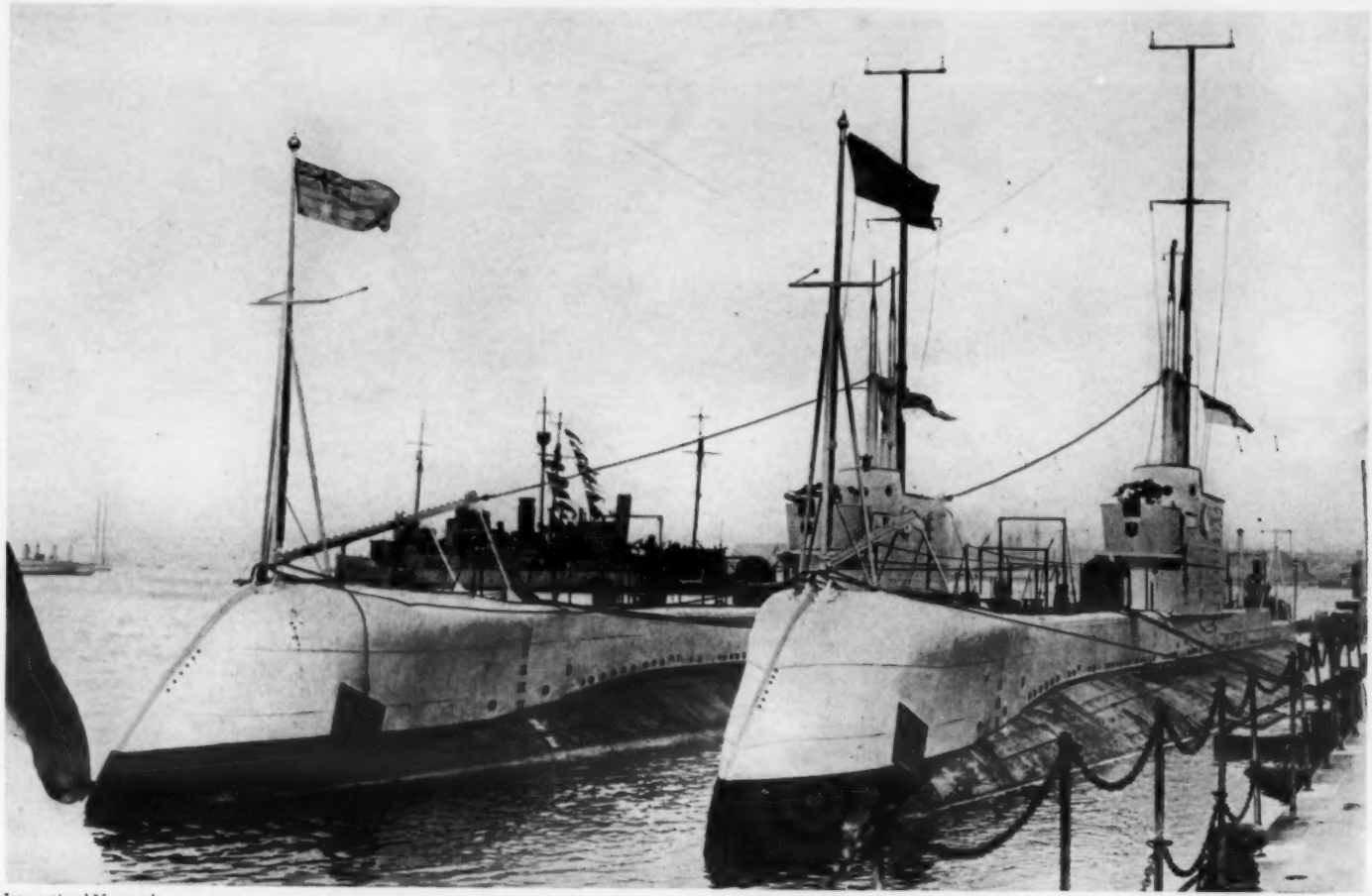
International Newsreel

PLATFORM USED FOR LOWERING DIVERS OVER THE SIDE

International Newsreel

MEMORIAL SERVICES FOR THOSE LOST ON THE *S-4*

The officers and men of the U.S.S. *Chewink* holding services for the dead, before starting their tests on the reconditioned *S-4*.



International Newsreel

SUBMARINES *OTWAY* AND *OXLEY* LYING AT PORTSMOUTH, ENGLAND
Built for service in Australia.

DISCUSSIONS

A Naval Research Reserve

(See page 976, November, 1928, PROCEEDINGS)

ENSIGN LEONARD B. LOEB, *U.S.N.R., Associate Professor of Physics, University of California.*—I have long felt that some form of organization of the scientific abilities of the United States to meet a war-time emergency seemed desirable. The article of Captain McDowell marks a big step in advance along these lines, and I am gratified to see that the initiative for the use for national defense of the scientific talent of the country is coming from the Navy itself. I should like to be permitted to make a few comments on the suggestions made by Captain McDowell, based on my experience as a physicist and professor of physics, as a former officer in the A. E. F. who was connected with the perfection of scientific instruments in sound-locating of airplanes during the war, and finally as an officer in the naval reserve.

I. CATALOGUING OF AVAILABLE SCIENTIFIC INFORMATIONAL RESOURCES OF THE UNITED STATES

The suggestion made by Captain McDowell that a list be prepared of naval problems requiring expert technical advice, is a thoroughly worthy one. In addition to such a file, I recommend that a second file of the following sort be prepared, possibly in duplicate, one of names and the other of classified subjects. This file should contain a list of all scientific men in the United States—engineers, chemists, physicists, mathematicians, and geologists—who would be interested in any time of emergency in coöperating with the Navy. This would comprise some five thousand names and should include, besides the addresses and positions, the fields of work with which the men are sufficiently familiar to enable them to give valuable advice in case of need. Such a list, when a need arises, would lead to making available a group of experts who could be called together at a moment's notice in response to any problem arising. The preparation of such a list would not entail very great labor, inasmuch as the recent edition of *American Men of Science* contains valuable information of this sort in a handy form. Circular letters might be written to such men, asking for supplementary information and determining their willingness to coöperate.

II. COMMISSIONING OF OFFICERS IN THE NAVAL RESEARCH RESERVE

The suggestions of Captain McDowell concerning the commissioning in the reserve of a certain number of scientists throughout the country who are sufficiently interested to be willing to devote the same amount of time as any other reserve officer, is a first-rate idea. My personal experience in the anti-aircraft sound-ranging service in France, as well as my contact with ignition problems in airplane motors during the war, have shown me the uselessness of the scientist who is put on a problem without being familiar with the service and the actual practical conditions surrounding the problem. Many beautiful devices were invented and perfected in our laboratories to meet the needs of the service which, due to lack of knowledge of actual operating conditions in the field, were practically useless.

In regard to the organization and commissioning of such officers, I approve heartily of the idea of local groups which can meet together for discussion with sufficient frequency to make the meetings useful. The ranks of the commissions would naturally be assigned on the basis of the man's

SUBMARINES BUILT AND BUILDING AT PORTSMOUTH, ENGLAND
Built for service in Australia.

position in his science in civil life. Such officers should be commissioned in sufficient numbers in certain localities to enable them to meet once a week to carry out the regular drill periods assigned to general service officers in the reserve. In lieu, however, of drill exercises of the usual sort, these meetings should consist of the presentation of papers on various more scientific subjects of interest to the naval service, with their analysis and discussion. Possibly a two-hour drill period once in two weeks would be more effective than the single hour allotted to the present reserve officers. Attendance should be kept and recorded, as is the case with the present naval reserve officers. Where possible, these meetings should be held with regular naval reserve units, in order to bring the scientists in closer touch with the organization. It seems to me that it should be a patriotic duty to function in this capacity without retainer pay, that is, on a volunteer status. These officers should, furthermore, be required to take at least fifteen days of sea service annually, with pay appropriate to their rank. This is done frequently for the present volunteer naval reserve officers who are fulfilling the various drill requirements during the year, and contributing their part to the morale of the reserve units. This sea service should, however, place these officers aboard various ships in which devices are used which are of the nature with which they will be occupied in case of an emergency. They should be placed as understudy to some regular line officer occupied with the handling of that portion of the ship involving these appliances. They should stand regular watches appropriate to this duty, and in other ways learn the ways of the life of the sea and of the routine of a ship. In certain rare instances it should be made possible to fulfill the requirements of this sea service by other appropriate duty, such as service as research worker in the naval research laboratory at Bellevue, or engaged in research under appropriate direction in the proper place. The organization should be sufficiently elastic to enable a man to employ not only fifteen days, but a whole summer, if needed, in such service. Satisfactory research on a problem cannot be done except with sufficient time. Retainer pay should be given for such service. In general the regular sea service, as discussed above, should be required, the special service mentioned being only for cases where an immediate problem requires technical assistance. It is unwise, in my estimation, to have all these men detailed to laboratories for a fifteen-day period, inasmuch as little can be accomplished in that time. In all cases a report of the investigation or period of training should be submitted by the research officer to the commanding officer of the ship or research unit, concerning his activities. The nature of the research officer's report should determine the rating of the research officer on his fitness report for that training period.

Commissions should be given only to those men who have the Ph.D. degree or equivalent degree in engineering. It might be well to attempt at first to gather together a group of not less than five nor more than fifteen such research officers in each naval district. Possibly the group should consist of three mathematicians, three chemists, three physicists, and three engineers, with three more in appropriate divisions of science in which the region is strong.

Some provision should be made for the promotion of the naval research officers as their work warrants promotion. I do not believe that the naval research reserves should have rank exceeding that of lieutenant commander. It might be possible that to a man of instructor's grade the rank of ensign in the naval research reserve should be given. Assistant professor or equivalent should be given the rank of lieutenant (j.g.); associate professor, the rank of full lieutenant; and a full professor or the equivalent, the rank of lieutenant commander. An adequate promotion system might be one based on length of service, such that a man who enters with the rank of ensign should be eligible for promotion on a six-year basis, provided his service is satisfactory, unless the services rendered have been of such value as to indicate more rapid promotion. Such a promotion system is essential to bring the highest type of man into this organization, inasmuch as it is discouraging to a man to enter the service as an ensign, and finally achieve distinction in a subject which makes him a professor, and then to see men who entered the service later with higher university or professional rank placed above him, though his juniors or equals in years or achievement.

III. Research Fellowships

I believe that funds expended on naval research fellowships of an appropriate sort could hardly be better spent. Care, however, must be utilized in the granting of these fellowships. It is unwise, in my estimation, on the basis of observation in practice, to grant a number of fellowships or even one fellowship continually to each of a certain number of institutions. My experience in training of graduate students and the appointment of university teaching fellows has indicated that it is impossible to have always at hand a first-class graduate student capable of filling a fellowship in a given line of work. We have had this experience in Berkeley. Some years there are no first-class man; other years there may be first-class men, but none who would be interested in problems of importance to the Navy. Thus last year we happened to have one man interested in problems of radio telegraphy, who would have been admirable as a candidate for such a fellowship, and would gladly have undertaken it. Two years ago we had no candidate for it. I would suggest that, say, ten or more fellowships be created, paying from $750 to $1,000, these to be awarded by a board composed of officers of the Navy and representatives of the National Research Council, on application from scientific departments or institutions who had men available to work on problems of interest to the Navy. A list of problems which might be investigated should be kept on file at the Navy Department, possibly suggested by the experts at the Bellevue laboratory. On application from a university, the credentials of the candidate, and his scholarship record, accompanied by recommendations of men who are acquainted with his ability, should be submitted to the board. The capabilities of the candidate should be considered and he should be chosen on his merits. The committee should then scrutinize the personnel of the department involved, to see whether there was any man on the faculty capable of conducting the research. If, in the eyes of the committee, the man was worth while, but the department incapable of directing the research, the man should have the privilege of taking up the research under the fellowship at some institution where proper direction could be given. It has come to my attention that unfortunate results have been obtained in cases where postgraduate and graduate students were sent to institutions to carry on research where there was no one fully capable of directing the research. If the fellowships could be granted under these conditions they should exhibit the unexpectedly great success of the postgraduate fellowship system operated by the National Research Council during the last nine years.

It would seem logical that these students should be given ratings in the naval reserve analogous to the rating given the midshipmen at Annapolis, and that on completion of their thesis work they should be awarded commissions as ensigns in the naval research reserve.

It seems advisable that the research problems assigned under the fellowships should be of a more fundamental and general character, the results of which could generally be published in scientific journals. The reason for this lies in the requirement for the doctor's degree; many institutions demand publication of the thesis material in scientific journals. It is, of course, obvious that the details bearing on naval problems might be omitted, but the fundamental plan of the work must ostensibly be of a more purely scientific nature. This is consonant with the wiser policy that all secret or confidential investigations carried on for naval purposes should be carried on inside of laboratories which are under the direction of the United States Navy. If a fundamental thesis problem contains elements of great importance to the Navy which should not be published, these might be pursued by ordering to temporary active duty the worker (who has obtained ensign's rank in the naval reserve) for a period of a year or two, after he has his degree, to develop his researches further at a naval research laboratory. To obtain with ensign's rank and pay the services of such a man for a year at Bellevue on an important problem in which he had already covered the groundwork of the technique, would be the best investment the Navy could make. After the solution of the problem the man could easily be returned to his reserve status without any detriment to the Navy or himself.

The Relation of Aircraft to Sea Power

(See page 721, September, 1928, PROCEEDINGS)

MAURICE PRENDERGAST.—Both the October and November issues of the PROCEEDINGS have reached me, and I, for one, am sorry that the above remarkable study has not been further discussed. Was not the Secretary-Treasurer lamenting, in his "Notes" some months ago, that there was a dearth of articles on technical subjects? And yet when one such article appears—and an excellent one at that—little interest appears to be taken in it.

Towards the end of his contribution to the September issue, the author (Lieutenant Commander Bruce G. Leighton) declared that "The Relation of Aircraft to Sea Power" is a subject worthy of the most serious study. He urged "the very widest discussion on the part of every person connected with the naval strength, from the commander in chief to the 'plebe' at Annapolis. . . . ." No response, up to date! Must I then, a humble civilian associate member, rush in where the angels of the quarter-deck and the campus fear to tread?

SYNOPSIS.—As it is some months now since the Leighton article appeared, we may as well refresh our memories, by giving a brief résumé of the arguments there presented.

Lieutenant Commander Leighton's main contention was roughly this:

1. Guns, torpedo tubes and airplanes are mounted on ships, and taken out, far from land, so that men may carry on warfare upon the high seas.

Cancelling the factor of human manipulation as common to all arms—

2. The battleship is a gun carrier, and the fundamental basis for major gunnery operations at sea. The destroyer and submarine are torpedo carriers and they are the fundamental basis for successful torpedo operations.

3. Practical experience has taught that successful air operations with the fleet must be based on ships. Therefore, the ships that carry airplanes at sea (the aircraft carriers) are as much "weapon carriers" as the battleship, destroyer, and submarine.

4. It follows that we must regard and treat airplanes as the weapons *of* ships.

(This, by the way, is what the high-brow logicians call a syllogism, but we need not trouble ourselves about that!)

If it were denied that airplanes, as the weapons of ships, are in the same category as guns or torpedo tubes, Lieutenant Commander Leighton proceeded to refute such denials, by drawing parallel comparisons. He argued that the bomber was simply a "flying gun" and the torpedo plane a winged, mobile torpedo tube. He remarked that scouting, smoke screening, and so forth, were the same, whether carried out by surface ships or aircraft. It was pointed out that, by the very versatility of her airplane weapons, the aircraft carrier could function as a battleship, cruiser, or destroyer. (This is the method of reasoning by analogies, but we need not worry our heads about that either!) Where non-similarity existed between the aircraft carrier and other types of combatant vessels, Lieutenant Commander Leighton thought the points of non-similarity to be entirely in favor of the airplane-armed vessel. For one thing, as her size lessens, her power and usefulness may increase; for another, she can "modernize" herself, by adopting new airplane weapons, far more easily than the battleship can improve the performance of her big guns. Finally, we were invited to consider this question: If the aircraft carrier is a capital ship, which is the better type of capital ship, the battleship that can throw her projectiles to an extreme range of 35,000 yards, or the aircraft carrier that can "throw" her projectiles to a distance of 200,000 yards. Which of the two types of fighting ships here indicated is the more likely to survive, remembering that "increase in striking range has always been the predominant factor in the development of all armament?"

It is, by the way, interesting to compare this passage in the Leighton article, with the chapter on "Eternal Principles" which the late Fred Jane embodied in his *Heresies of Sea Power,* written in 1906 (pages 273-4):

> It is an eternal principle founded on the past that progress is always on the side of extended radius of ship or weapon. . . . . The tactical area is expanding as the strategical one relatively contracts.

PRINCIPLE AND PERFORMANCE.—"The Relation of Aircraft to Sea Power" teems with subjects worthy of the keenest debate,

but only a point here and there can be selected for present discussion. Take the matter of "gun fire." The author asks us, what difference is there in principle between the shell and the bomb? The former is propelled by the "push" of powder; the latter is "tractored" by the "pull" of a gasoline engine; but both are hurled through space from discharging vessel to target vessel, and both are meant to do the same destructive work.

There may be no difference in principle, but there may be a world of difference in the efficiency of performance. Commander Herbert S. Howard (September PROCEEDINGS, Discussion pages) points out that ammunition capacity (and therefore frequency of fire) may make the big gun worth while, and the big bomb not worth while at all. Submitted that we briefly consider the relation of "time of flight" to "tactical opportunity." Battle may offer a sudden opportunity, which, if promptly seized, may settle the issue of the day. Which weapon will be the more ready to seize the chance, and concentrate fire on a selected part of the enemy force—the big shell, leaving the muzzle of the gun at a speed of (about) 1,800 miles an hour, and with a "time of flight" measured in seconds, or the big bombs leaving the flight deck at a speed of about 100 miles an hour, and with a "time of flight" measured in minutes? You cannot count on your bombers being over the enemy line when the decisive moment comes. They may still be on the flight deck.

Lieutenant Commander Leighton stages for us an imaginary, full-dress naval battle. Admiral Aladdin gives the good old lamp a rub on his sleeve. His battleships are magically converted into aircraft carriers. Aladdin, commander in chief, then proceeds to "out-range" and wallop his opponent off the map. Very nice indeed—in theory! But suppose the opposing fleets had made contact, unexpectedly, and before Aladdin could grab the lamp? If Jutland has taught any lesson at all, it has taught the fallacy of assuming that you will get a nice "contact," all the time you want for deployment, and that you will fight your battle under visibility conditions most favorable to your own weapons.

THE FUTURE OF AIRCRAFT CARRIERS.—Aircraft carriers, are at present, few in number. They have, therefore, to be freighted with all types of airplanes, so that experience may be gained with all types of airplanes in fleet operations. Lieutenant Commander Leighton has shown us the carriers functioning as battleships, cruisers, destroyers, and so forth. These ships are still experimental, and therefore rather indeterminate in their features. How long will that indecision (and the multiplicity of aërial weapons carried) last?

Hector C. Bywater (gold medallist of the Institute) and the present writer collaborated in 1923 in the writing of a "future war story." This joint effort was published, in serial form, by the *Practical Engineer* (London), May-July, 1923. With strategy and tactics it had little to do, but the future development of warship types was considered with some care, and special attention was devoted to the aircraft carrier. Looking forward from 1923, what field of development lay before the airplane-armed ships?

Twenty years ago, there was only one class of submarine—the submarine. Fifteen years ago, there was only one type of aircraft in use—the airplane. Today, we have the fleet submarine, first and second line submarines, and mine-laying submarines. On the aircraft side, we have the bomber, fighter, scout, and so forth. The "tank" that came into the field as a "tank" pure and simple, has also, I believe, subdivided itself into several types. Does not this seem to indicate that when a new weapon (or weapon carrier) has successfully passed through the "try-out" stage, it tends to subdivide itself into special-function types? Would the same process of development be followed with the aircraft carriers?

Mr. Bywater and myself thought it was not unlikely that such a line of progress would be pursued. The clumsy, double-barreled expression "aircraft carrier," we assumed, would be, in time swept away, and replaced by the compact, one-word expression—"planeships." And no longer would the rechristened aircraft carriers carry an assorted assortment of all sorts of "birds," and be floating aviaries. They would carry one type of airplane, and specialize in the operation of that one type. Therefore, we would eventually get bomber

planeships, carrying only bombers; torpedo planeships, carrying torpedo planes exclusively, and so on.

If a bomber planeship ever came into being, what would she be like? From the Leighton analogy that the bomber is a "flying gun," the bomber planeship would probably approximate to the battleship—big, rather slow, well defended, with great striking range. The scout planeship would, of course, be the lineal descendant of the present cruiser. The torpedo planeships would, perhaps, bear a resemblance to the destroyers—numerous, nimble, fast. But is it safe to predict that future planeships will operate one type of aircraft exclusively? Even the gun-carrier battleship finds a use for the torpedo tube, and the torpedo-carrying destroyer and submarine mount and use the gun. All types of planeships would probably have to carry fighters for their own defense. But it seems almost inevitable that, sooner or later, one aircraft carrier will show high-efficiency performance with one type of aircraft. She will be selected to "specialize" in that one type. Then will the aircraft carriers divide and go their different ways, using differing aircraft weapons.

AIRPLANE-CARRYING CRUISERS.—Lieutenant Commander Leighton suggests that, instead of devoting all future cruiser tonnage for the U. S. Navy to the building of 10,000-ton units, armed with 8-inch guns, certain cruisers might be built with an enlarged airplane-carrying capacity. He points out (quite correctly) that, under the terms of the 1922 naval treaty, airplane-carrying ships of *less* than 10,000 tons (standard) displacement, would not be liable to inclusion within the rationed aircraft carrier tonnage. Could anything be done, in the way of producing a cruiser type, with enlarged facilities for freightage of airplanes?

When Mr. Bywater and myself were planning out our "future war story," a sort of prophetic "Ships' Data Book" was drafted, listing the future types of warships that we were to operate in our "war game." Now amongst the yet-to-be-built fighting ships, was a class of "aircraft-carrying cruisers," exactly of the type suggested by Lieutenant Commander Leighton. Known as the "*Boscawen* Class," it was to be 9,800 tons displacement (standard) and was therefore not an "aircraft carrier" under the definition of the 1922 treaty.

The illustration artist wanted some materials to work from, so the "*Boscawen* Class" *had* to be roughly designed. And it had to be a fairly practical kind of ship—the sort of ship that could, and might be actually built. Later, in 1926, a small model of the *Boscawen*, twelve inches long, was built, as a "try-out." A photograph of this model is reproduced at the end of this article. (The tower mast is much too high, and could be reduced by half with advantage.)

When the *Boscawen* was planned, the following conditions had to be complied with:

(a) Her gun armament was to be as good as—and if possible better than—the battery of any of the treaty-type cruisers forecast in 1923.

(b) She was to carry and operate more airplanes than any type of cruiser building or projected in 1923.

(c) She was to be capable, as far as possible, of operating her guns and aircraft simultaneously.

The model shows that *Boscawen* was a sort of "centaur-ship"—fore half a cruiser, after half an aircraft carrier. The turrets, of course, wanted center-line positions, so as to be able to hit out on either beam. And the airplanes wanted all the center line (and a bit on each edge) for *their* aft-forward operations. If guns and plane were to be operated forward, together, they would only be worked in by setting them at two differing levels.

The way in which it was proposed that the airplanes should be handled was thus:

1. To be flown on, aft, in the usual way. If not required at once for further air duty, to be shipped, by lift, into hangar below flight deck.

2. If required to take the air again at once, they were brought up forward, along flight deck, to a covered replenishing station (at flight-deck level) between the "beam funnels." When refuelled, reloaded, and so forth, the plane was moved by lift, up to the "transfer deck," triangular in shape, between (and before) the "beam funnels."

3. The plane again moved forward, crossing the folding, retractable, "transfer

bridge" spanning No. 3 triple turret. It passed through an archway cut right through the base of the tower mast, and was placed on the catapult over No. 2 triple turret, and shot off into flight again.

It was estimated that ten to twelve airplanes could be carried thus: No. 1 "ready use" machine, on catapult; No. 2 ("reserve ready use") within arched passage at base of tower mast; No. 3 on "transfer deck" between funnels; No. 4 below "transfer deck," at replenishment station; Nos. 5 and 6, at forward end of flight deck, behind moveable wind-breaker screens; Nos. 6-10 (or 12) stowed below flight deck in hangar. Fighters with a fixed wing span not in excess of 40 feet or larger planes with folding wings could be used. If horizontal "smoke ducts" discharging smoke aft (as in H.M.S. *Argus* and *Furious*) were used, the "beam funnels" could be replaced by two more catapults.

One of the problems presented in aircraft carrier design is, of course, that the flight deck must present a flush-level, unpierced surface. Accordingly all ventilation intakes and returns have to be worked into the hull side. Hence, in the *Boscawen* model, the square ports and perforated panels are set in the hull side.

The two masts standing abeam of each other and abaft the outboard funnels, serve to spread the radio antennæ, and also as standards for long-arm derricks. In the illustration, the derricks are seen turned inboard across the center line; they were added to the design for handling flying-boats and seaplanes. Boats are stowed in the four large, oblong ports in hull side. In addition to the nine main guns in the three triple turrets, fourteen A. A. guns were to be mounted, but no torpedo tubes were included in the design. Such, then, was the *"Boscawen Class"* of "gunplane cruisers," which, with "argushipS," "snoopers," "flitterbats," "owlboats," "dromeships," and big convoy guard vessels, made up a paper fleet for the paper warfare of "A Vision of Terror"—a yarn replete with freak fighting ships. (The warships were far more horrible than the war itself!)

THE FUTURE OF THE FLIGHT DECK.—The predominance of the gun-carrier battleship, says Lieutenant Commander Leighton, is chiefly due to the superior striking range of her guns. But does not her superiority repose, to some extent, in the armored-security of her weapons? Does not the weakness of the aircraft-ship weapon lie in the insecurity of the flight deck—that huge and vulnerable area from which they must rise and on which they must alight? Is the flight deck, as we know it today, *a permanent necessity or only a temporary expedient?* The author of "The Relation of Aircraft to Sea Power" thinks three 10,000-ton carriers would be better than one *Lexington*, because three flight decks would have to be disabled, instead of one, before the airplane could be prevented from operating. Would not a *smaller* flight deck, on *any* hull, big or medium, proportionately *increase* the power, and lessen the vulnerability of the aircraft-weapon? Flight decks cover the whole hull now; they cannot grow any larger, so perhaps they will grow less! Will they?

Go over an old sailing ship of the line, like the *Victory* at Portsmouth (England), or the *Implacable* at Falmouth. One thing at once strikes the attention. It is the enormous amount of space required, relatively to the whole ship, for mounting and working the tiers of guns. Then consider, relatively to the total bulk, the amount of deck space required for mounting and working the main guns, in a ship like the U.S.S. *Maryland* or H.M.S. *Hood*. The striking range of the gun-weapon has immensely increased; the area required for mounting and working it has decreased. Therefore, the area required for mounting and working the aircraft-weapon may decrease as striking range augments.

Will the flight deck ever disappear? How far would the battleship have got, had she to roll her shell down an inclined plane, until a muzzle velocity of 2,500 f.s. was attained? The value of the gun as a power generator is that it accelerates mass within a short length of travel. That is where the catapult scores over the flight deck, and the chances are that the catapult—whether of the pneumatic, hydraulic, steam, electric, or gas-propelled types—will eventually render the fore half of the flight deck unnecessary for taking off.

Will the after half of the flight deck—the space now required for flying-on—ever be eliminated too? You can ask me another! All I can says is this: we have the De

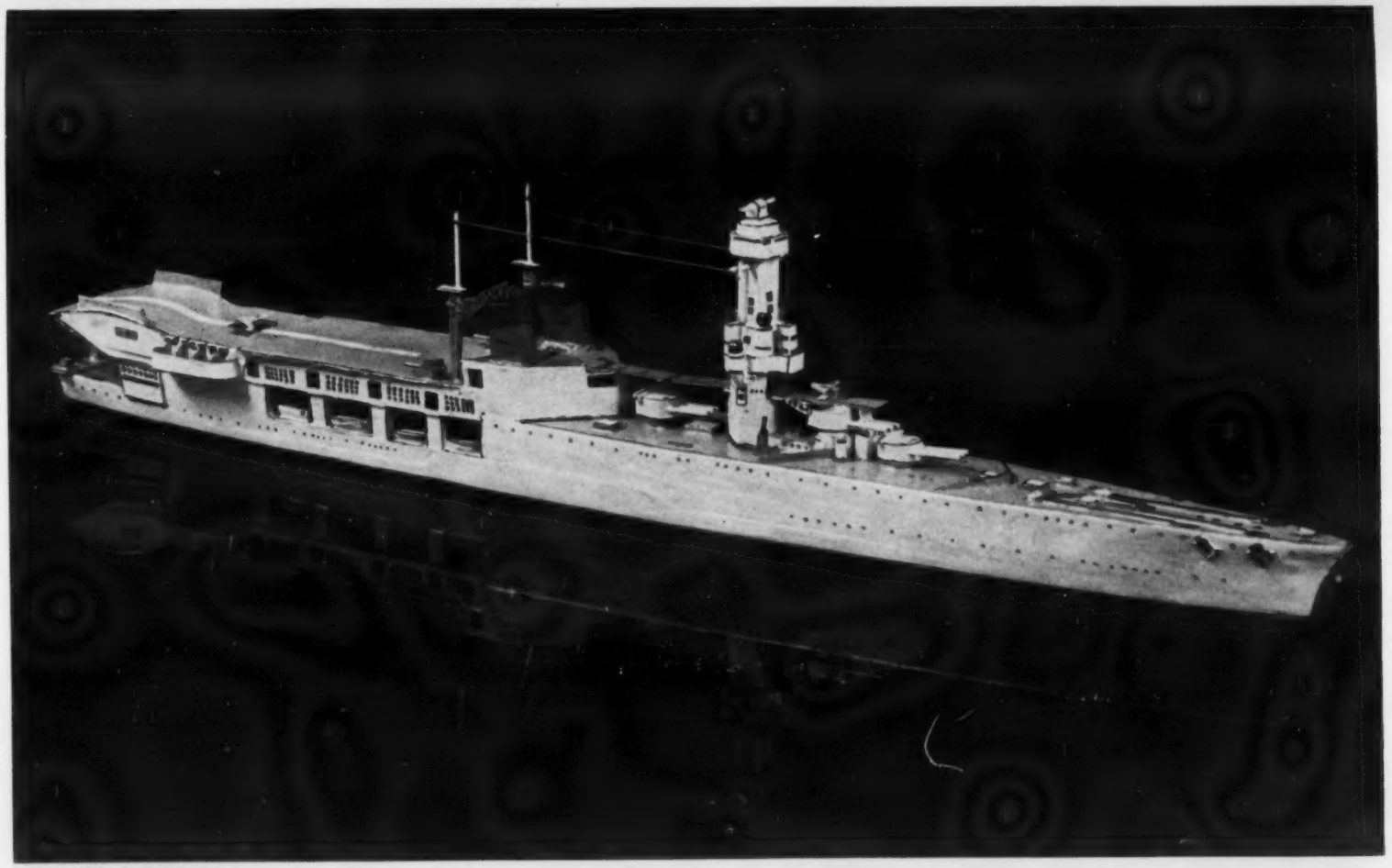
Cierva "auto-giro" windmill plane today, capable of almost vertical descent into a very restricted space. The "Pterodactyl" tailless monoplane, if it *does* possess its reputed stalling speed at 20-25 m.p.h. could relatively fly *backwards* over the flight deck of a thirty-three-knot carrier—which implies the possibility of a zero relative speed between ship and plane. The Handley-Page slotted wing holds the promise of a plane's hovering, nose to wind, over a deck. Think on what is being done today. Does it not foreshadow that, in years to come, airplanes will require a space but a few times their own length, to be brought to rest on shipboard? The flight decks of the hereafter will be so diminished in area that heavy armoring will be practical. The airplanes will get an ironclad, fireproof perch to sit on, instead of acres of inflammable, splinterable wood. (Can you see the planeship of the future coming, now? If so, tell me, what does she look like? For that I would be glad to know!)

THE "SMOKE SUBMARINES" AND THE ANTIDOTE.—Lieutenant Commander Leighton says: "The use of artificial smoke in combination with indirect fire with air observation offers enormous possibilities." If a ship can defend herself with smoke, then what is the use of *armor?* Is armor dying? Will defense by impalpable smoke replace defense by inches of steel plate? Shall we live to see the day when armorless capital ships, when attacking or being attacked, will enshroud themselves in immense, defensive palls of smoke?

In "A Vision of Terror"—the "future war story" referred to above—the final sea battle began by the hostile fleets approaching each other, enveloped in gigantic smoke clouds, covering square miles of sea. The combatant vessels, submerged in smoke, used their airplanes as a kind of "aërial periscope." If surface ships play the "smoke-submarine" game, themselves vanishing from sight, and using "aircraft periscopes,"—then how are "targets to be got?" The surface ships, denying themselves to visual-ranging methods, would, perhaps, have to be attacked as the submarine is attacked today, by sound-detection. But can acoustic detection be so improved that above-surface sound locaters or submarine microphones will be able to isolate individual "ship-sound" from the mutterings, burblings and rumblings of massed "fleet-sound?" The relation of aircraft to ships may be reversed in the end! Instead of aircraft "spotting" for the guns of ships, the ships may sound-locate targets for the aircraft, and the aircraft will then "depth-charge" the enemy's smoke cloud with their bombs. In that case, Lieutenant Commander Leighton will have to contribute another article, entitled, "The Relation of Warships to Air Power"—and may he live long enough to write that article!

The more one tries to look into the future, the more does one wonder if we really *do* advance. Study an old print of a sea fight between the fleets of Nelson's and Rodney's time. The old, sailing-fighting ships are wrapped in immense clouds of smoke. Then, take your modern photograph of a fleet using "smoke-screens." Your "capital ship of the future?" She may be an armorless planeship, that will bury herself in a vast cloud of smoke, whilst her fighting men, mounted in planes, will bomb, torpedo, and fight their enemies at the range that was the range on the day Trafalgar was fought.

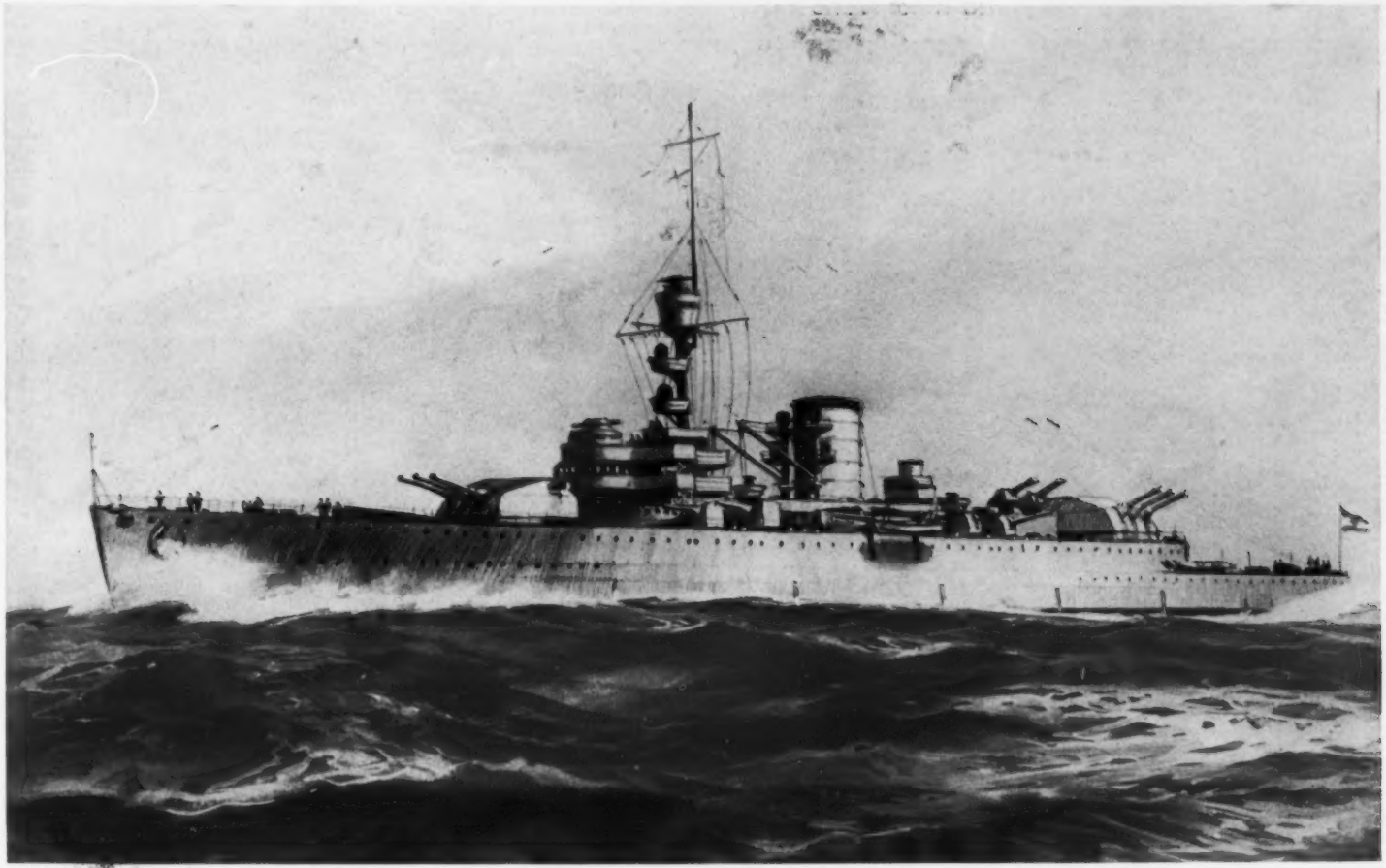
Are we "bound to the wheel?" Do we ever descend and ascend? With all our vaunted progress, do we really advance—or only return to the point whence we started?



Courtesy of Maurice Prendergast

EXPERIMENTAL MODEL OF AIRPLANE-CARRYING CRUISER *BOSCAWEN*

Designed by Maurice Prendergast. Model by A. G. Vercoe. Length (on water line) of model twelve inches. (See Discussion, "The Relation of Aircraft to Sea Power.")



Pacific and Atlantic Photos, Inc.

GERMANY'S NEW 10,000-TON CRUISER, *ERSATZ PREUSSEN*

Germany built this fighting craft at the Kiel Yards at cost of $20,000,000. By welding plates instead of riveting, 550 tons were saved. Diesel motors give speed of twenty-six knots, with engine weight about one-seventh of normal. The cruiser carries six 11-inch guns, eight 6-inch guns, four anti-aircraft guns, six torpedo tubes, and will have a cruising radius of 10,000 miles at 20 knots.

PROFESSIONAL NOTES

4 JANUARY TO 2 FEBRUARY

COMMANDER F. W. ROCKWELL, U. S. NAVY
LIEUTENANT COMMANDER A. C. MCFALL, U. S. NAVY
AND
PROFESSOR HENRY BLUESTONE, U. S. NAVAL ACADEMY

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GREAT BRITAIN

Torpedo Boat Destroyers and Flotilla Leaders

Engineering, January 11.—It was recently announced in the press that the French Ministry of Marine had placed orders for the construction of six flotilla leaders, two in Government Dockyards, and four by private shipbuilders. It was also stated that the new vessels are to be 422 feet in length and 38½ feet in beam, with a Washington displacement of 2,480 tons, corresponding to 2,630 tons with oil fuel, whilst the engines are to develop 64,000 shaft horse power, giving a speed of 38 knots. The official return, "Fleets (The British Empire and Foreign Countries)," published early last year, includes six flotilla leaders to be laid down by France in 1928, the displacement, the only detail given, being quoted as 2,400 tons. The particulars of three of the same type ordered in 1926, are: Displacement, 2,646 tons; engine power, 64,000 h.p., and speed, 36 knots; whilst those ordered in 1927 are stated to have the same displacement and speed but to be fitted with engines of 70,000 shaft horse power. The 1926 vessels have an armament of five 5½-inch and four smaller A.A. guns and six torpedo tubes, those of 1927 having an additional 5½-inch gun. Five slightly smaller vessels of the same type completed in 1926 and 1927 are of 2,359 tons, 50,000 h.p., and 35½ knots, the armament being five 5.1-inch and two 3-inch A.A. guns, and six torpedo tubes. It would appear from the displacement quoted for the six vessels recently ordered, that they are to be practically repeats of those ordered in 1927. There is a slight discrepancy in the powers and speeds stated in the press for the new vessels, and those given in the official return for those of the 1927 program, but if the 70,000 h.p. of the engines is taken as correct, the large increase on power over the vessel with 50,000 h.p. completed in 1926 and 1927 should result in the higher speed of 38 knots being attained.

Of the navies of other countries included in the return the flotilla leader appears only in those of the British Empire and Italy. The particulars of the British leader *Codrington* of the 1927 program are not included, but the largest of this type completed are the seven vessels of the *Campbell* class laid down in 1917, these having a displacement of 1,800 tons, engines of 40,000 h.p. and 36½ knots speed, the armament consisting of five 4.7, one 3-inch A.A. and seven smaller guns and six torpedo tubes. In 1927, the Italians laid down twelve flotilla leaders of 1,968 tons, 50,000-h.p. and 38 knots speed, with an armament of six 4.7-inch guns and six torpedo tubes, whilst three of the type completed in 1925 of 1,954 tons, 42,000 h.p. and 34 knots speed, mounting eight 4.7-inch and two 3-inch A.A. guns and six torpedo tubes. A comparison of the foregoing details with those for the new French vessels, shows that the latter are of considerably greater displacement, which should be attended by better seagoing qualities, and mount a more powerful gun armament than those of the other two nations. Twenty-five years ago, when warship displacement were far more moderate than at present, the French flotilla leaders would have been classed as cruisers.

The precursor of the flotilla leader was the British warship, *Swift,* laid down at Messrs. Laird's, in 1905, and which at the outbreak of war was designated a flotilla cruiser, having attached to her the fourth destroyer flotilla of twenty vessels. Three cruisers of the *Boadicea* and eight of the *Sentinel* classes were at the heads of other destroyer flotillas. The *Swift* was 345 feet in length, 2,200 tons displacement, and fitted with turbine machinery developing 30,000 h.p., giving a speed of 35 knots, the armament being four 4-inch guns and two 18-inch torpedo tubes. In 1913 and 1914 the British Admiralty placed orders for four vessels—*Marksman* class—which appear to have been the first termed flotilla leaders. These were of 1,670 tons, 36,000 h.p. and 34-knots speed, with an armament of four 4-inch, and seven smaller guns and four 21-inch torpedo tubes. Italy also laid down in 1913 two of the same type, *Aquila* and *Falco,* the displacement being 1,705 tons, engine power 40,000 h.p., and speed 35 knots, mounting five 4.7 and four 3-inch A.A. guns and four torpedo tubes. The French did not adopt the type until 1923, and neither the United States nor Japan has yet built any vessels of the type, although the former has nine projected, but not yet authorized.

The original purpose of the type, as the

TABLE I—COMPARISON OF FLOTILLA LEADERS AND DESTROYERS

Flotilla Leaders.				Destroyers.			
	British						
1905	*Swift*	2,200 tons 30,000 h.p. 35 knots	Four 4-inch guns Two torpedo tubes	1905	*Tribal* class	865–1,140 tons 14,500 h.p. 33 knots	Two 4-inch guns Two torpedo tubes
1913	*Marksman*	1,670 tons 36,000 h.p. 34 knots	Four 4-inch guns Two 2-pdrs. Four torpedo tubes	1913	*M* class	1,030 tons 27,000 h.p. 34–35 knots	Three 4-inch guns Two 2- pdrs. Four torpedo tubes
1916	*Shakespeare*	1,550 tons 40,000 h.p. 36 knots	Five 4.7-inch guns One 3-inch H.A. gun Six torpedo tubes	1916	*R* class	1,065 tons 27,000 h.p. 36 knots	Three 4-inch guns Six smaller guns Four torpedo tubes
1917	*Campbell*	1,800 tons 40,000 h.p. 36½ knots	Five 4.7-inch guns One 3-inch H.A. gun Six torpedo tubes	1918	*V* class	1,350 tons 30,000 h.p. 35 knots	Four 4.7-inch guns Seven smaller guns Six torpedo tubes
	French						
1922	*Jaguar*	2,359 tons 50,000 h.p. 35½ knots	Five 5.1-inch guns Two 3-inch H.A. guns Six torpedo tubes	1923	*Simoun* class	1,437 tons 33,000 h.p. 33 knots	Four 5.1-inch guns One 3-inch. A.A. gun Six torpedo tubes
1926	*Lion*	2,646 tons 64,000 h.p. 36 knots	Five 5½-inch guns Four smaller A.A. guns Six torpedo tubes	1926	*Basque* class	1,471 tons 35,000 h.p. 33 knots	Four 5.1-inch guns One 3-inch A.A. gun Six torpedo tubes
	Italian						
1921	*Tigre*	1,954 tons 42,000 h.p. 34 knots	Eight 4.7-inch guns Two 3-inch A.A. guns Six torpedo tubes	1922	*Q Sella*	1,132 tons 28,000 h.p. 35 knots	Three 4.7-inch guns One A.A. gun Two smaller guns Four torpedo tubes
1927	*U. Vivaldi*	1,968 tons 50,000 h.p. 38 knots	Six 4.7-inch guns Six torpedo tubes	1926	*Zeffro*	1,334 tons 35,000 h.p. 36 knots	Four 4.7-inch guns Three A.A. guns Three smaller guns Six torpedo tubes

TABLE II—FLOTILLA LEADERS AND DESTROYERS BUILT OR BUILDING

	Flotilla Leaders					Destroyers				
	British Empire	United States	Japan	France	Italy	British Empire	United States	Japan	France	Italy
Built	17	Nil	Nil	7	11	150	309	114	45	64
Building	1	Nil	Nil	12	12	8	Nil	12	19	3
Projected	2	9	Nil	6	Unknown	18	Nil	13	Nil	Nil
Totals	20	9	Nil	25	23	176	309	139	64	67

designation implies, was to act as the leader of a flotilla of destroyers, and to carry the commander of the flotilla and his staff, with all the necessary facilities for directing the operations of the mosquito fleet. For this purpose it was necessary that the flotilla leader should be capable of maintaining her position at the head of the flotilla in all circumstances of weather, sea, and condition of bottom. A superiority in sea-going qualities was thus an essential, and this was secured by a greater displacement, combined with a designed speed equal or superior to that of the other units of the flotilla, which for the greatest efficiency was composed of vessels of one class. A comparison of the particulars of the flotilla leader with those of contemporary destroyer indicates how this superiority has been obtained, the British vessels being necessarily of earlier dates of construction than those of the French and Italian navies. This comparison is given in Table I, the details being mainly derived from the official return already referred to.

In addition to the gradual increase in the size of the two types of war vessel, the tonnages inserted in the table show that whilst the latest quoted British and Italian leaders are 450 and 634 tons respectively

larger than the contemporary destroyers, the difference between the two French types is 1,175 tons. The 1913 and 1916 British leaders are of the same maximum speed as the destroyers laid down in the same years, but the *Campbell* class are faster than the *R* & *V* classes by ½ and 1½ knots respectively, compared with differences of 2 knots and 3 knots for the latest Italian and French types quoted in the table. The numbers of torpedo tubes, in both types in the three navies is the same, viz., six in the latest examples, and the primary artillery armament in all destroyers consists of four guns. The British and French leaders mount one more of the largest caliber gun than contemporary destroyers, but the 1927 Italian leaders have six guns of the largest caliber, and this number is being adopted in later French leaders than those included in the table. The 4.7-inch gun with a projectile of 50 pounds is the largest gun mounted in British and Italian vessels of both types, as compared with 5.1-inch guns with a projectile weighing 70 pounds in French destroyers, and 5.5-inch with projectiles of 80 pounds in French leaders.

The return quotes the number of flotilla leaders built, building, and projected, by Japan, as nil, but a glance at the particulars of eleven destroyers ordered for the Japanese Navy in 1926 and 1927 indicates that these have the usual attributes of leaders, being of an appreciably greater tonnage, and mounting a more numerous gun and torpedo armament than the Japanese destroyers immediately preceding them, and than the contemporary destroyers of other navies. These eleven vessels are stated to be of 1,700 tons, and 34 knots speed, with an armament of six 4.7-inch guns and nine torpedo tubes, compared with 1,450 tons, 34 knots speed, four 4.7-inch guns and six torpedo tubes for destroyers laid down in 1925 and 1926.

The particulars of the nine projected American leaders are not stated, in the return, but of the 309 completed destroyers with the U. S. Navy about 60 per cent are of 1,215 tons, 35 knots speed, carrying four 4-inch and one 3-inch A.A. guns, and twelve torpedo tubes, the heaviest torpedo destroyer armament afloat.

The purpose of a flotilla leader being to serve as the flagship of a flotilla of destroyers, the number required in a navy will be governed by the numbers of destroyers, and of the units comprising a flotilla. A reference to the Navy Lists show that in 1914, fifteen to twenty destroyers formed a flotilla, but at present these are reduced to eight. Table II above gives the numbers of leaders and destroyers built, building, and projected for the various navies, and is compiled from the return.

Of the 176 British destroyers, 15 are in the Australian and 6 in the Canadian Navy, leaving 155, which with the 20 leaders would form 20 flotillas of seven or eight, the latter being the number already mentioned. The 139 Japanese destroyers include 22 which have already passed the effective age limit of sixteen years, and are now to be used as mine-sweepers, leaving 117 serviceable for the ordinary purposes. If the 11 large destroyers laid down in 1926 and 1927 and referred to above are deducted, the remaining 106 would form 11 flotillas of nine or ten units each, with the 1,700-ton vessels as leaders. The large numbers of French and Italian leaders, especially in comparison with those of the destroyers, together with the fact that no more of the latter type are projected, suggest that the leaders are not to be used wholly for the same purpose as those of the British and Japanese, but possibly as independent units, the very powerful gun armament and high speed of the latest French vessels rendering them suitable for such a purpose.

Cruiser Speeds

Naval and Military Record, January 9.—The Admiralty were satisfied with a "legend speed" of 32 knots for the 10,000-ton cruisers of the *Kent* and subsequent types, but it was generally expected that they would aim at something higher in the smaller *York* class of 8,400 tons. It now appears, however, that rather the reverse is the case. The machinery of these ships is designed to develop 80,000 s.h.p., which is estimated to give a speed of 31.25 knots. In comparison with what other powers are doing in their new cruiser types this is rather a poor showing. The United States, Italy, and Japan are all aiming at 36 knots for their new 10,000-ton ships. Probably France will come into line, although her latest completed ships have not done much more than 32 knots, and this from all reports, with considerable difficulty. The fact is that very

high speed is such a costly asset as to be scarcely worth while. In any case it is usually more of a textbook formula than a definite fixed point. The latest German battleships at Jutland disconcerted Admiral Jellicoe by proving substantially faster than their credited speed, yet when they were interned at Scapa after the Armistice an examination of their machinery disclosed that this had been accurately described in the published details.

It may be recalled that the old *Kent* at the Falkland Battle climbed up to nearly two knots more than her full-power trial speed, to the delighted astonishment of her people. Speed means steam pressure, and steam pressure means fuel consumption, and official formulas set definite limits to these which may be substantially exceeded. Thus the speed of the *Yorks* is estimated upon 80,000 s.h.p., but they may be "blazed up" to a considerably higher power. The only real value of this capacity is as a tactical asset in action, when an extra knot, even if only sustained for half an hour, may make a decisive difference. The full-power speed of a warship is not intended to be regarded as her practicable sea speed. One of the chief merits of the turbine is the fact that, relatively, its top speed is its economic speed. That is to say, it is giving fuller value for fuel consumption at top speed than at low speed. But the fuel consumption is too heavy to be maintained indefinitely. The 33-knot cruiser *Enterprise*, when hurrying home with the Prince of Wales, could not maintain more than an average of 25 knots between Dar-es-Salaam and Brindisi—and a splendid performance, too. Yet she can work up to more than 33 knots when it does not matter how rapidly she is emptying her fuel tanks. The British Navy wants sea-keeping cruisers of the utmost possible endurance, not armored railway trains which have to make frequent stops to replenish their empty tenders. During the present century the top speed of cruisers has advanced from 20 to 36 knots. It is very doubtful whether during this period the economic speed has advanced by more than three knots.

FRANCE

French, English, Italian Views on Mining

Naval and Military Record, January 2, by J. B. Gautreau.—A noteworthy addition has just been made to the French mining fleet with the launching at Toulon of the *Saphir*, "sousmarin mouilleur de mines," named after a submarine of 390 tons (8 per cent buoyancy only) that was lost in the Dardanelles at the same time as several British vessels. The new *Saphir* is much larger and also more formidable, having benefited from the experience gained, during the war and since, with the remarkable German minelayers incorporated into the French Fleet and with the two post-war minelaying submarines *Maurice Callot*, of 932-1,300 tons (27 mines of 440 pounds), and *Pierre Chailley*, of 900-1,200 tons (40 mines of 400 pounds). The new *Saphir* is smaller than the last named and built on different lines, although about as powerful. Minelaying is a risky game, as war casualties well show. For use in European waters especially reduced size is to be recommended, as far, at least, as compatible with satisfactory conditions of habitability and fighting radius of action. All points considered, it will be difficult to beat the *Saphir* type, that counts half a dozen representatives building in the French Navy. The length is 66 meters, the surface displacement 765 tons, and submerged 925 tons, and the speed of only 12 knots, with 1,300-h.p. The armament will include 32 mines of improved Sauter-Harlè type of 460 pounds, six torpedoes of 22-inch diameter, together with a 3-inch quickfirer. The *Saphir* design is though by French mining specialists to be an ideal compromise. Speed is unnecessary, dangerous even, for mining. Slow, eel-like gliding through minefields has saved many a submarine in the last war. A brutal direct shock is required to explode most mines. The point most essential is safe, easy, and quick minelaying, with good, reliable control appliances and as great homogeneity as possible.

The importance of submarine minelaying, in the light of war data, is great, and it is significant that Germany built mostly minelayers at the end of the conflict, German submarines mining the approaches to many French and English ports, as far as Dakar and even further. The British Navy trusts principally to surface minelayers for the reason that surface minelaying partakes more of offensive operations, and it permits quick, decisive intervention over an extensive zone. Mining cruisers of 27 to 30 knots can at an instant's notice, put to sea with

800 or 1,000 mines, and within ten hours or so place an insuperable obstacle in the way way of an enemy 200 or 250 miles distant, thereby greatly influencing strategic conditions. Comparatively, the under-water minelayer is a slow, cumbrous, short-ranged, and purely defensive fighter, at least when not exceeding 12 knots in speed and 800 tons in displacement. In narrow seas, however, such as the Mediterranean, relatively small mining crafts are useful in offensive operations. No wonder Italy is pinning her faith in minelaying. Her mining flotilla is numerous. Within the first night of hostilities the principal ports of a Mediterranean enemy would be sealed by carefully-planned layers of mines, provisorily, of course, but mine-sweeping means lost time and opportunities, besides considerable risks. Moreover, outside of ports, narrow sea passages of strategic importance are so many that it would be of obvious advantage to mine in order to impede the movements of the other side. To attend to those many mining requirements, to render the mine a perpetual danger in the Middle Sea, number is required, which gives relative invulunerability and ubiquity. Such is the wise policy of Italy who aims at effective power on economical lines, and considers the mine as the cheapest weapon in existence both for offence and defence, and rightly so, since a single mine with luck can account for the largest ship.

The French mining fleet is, numerically, much inferior to that of Italy. It includes, besides the six units of the *Saphir* type building, the before-mentioned *Callot* and *Chailley*, the ex-German *René-Audry* (1917) of 1,300-1,800 tons, fitted to carry thirty-eight mines, *Victor Revellé* (1916) of 650-820 tons, also capable of carrying thirty-eight mines, with an inferior torpedo armament and a submerged speed of only 6 knots. The 450-ton *Astrée* (1915), that had twelve mines, has just been discarded. The two ex-German boats, especially the last named, have at the most two or three years of active life in front of them; and they will be condemned as soon as the second batch of *Saphirs* become available for commissioning. Thus, a small mining force. There is a demand for a more efficient mining fleet. The Toulon Mining School is providing specialists at a good rate, and experiments with implements of mining warfare are ever going on. In wartime most ships would carry mines in addition to their armament, as is being done in the Italian Navy. A new and interesting departure will be made with the launching at Lorient next spring of the chrîseur-mouilleur de mines *Pluton*, that was laid down last April. The *Pluton* is a reduced copy of the British *Adventure*. On paper she is even superior, being designed for 30 knots against 27 for the English vessel and mounting also a superior gun armament; but her complement of mines will only be of 250 of the heavy type. Designs have been prepared for an improved *Pluton*, and also for mining gunboats of 700 tons of the modified pre-war *Cerbere* type, intended for coast and colonial defense.

A combined attack against Toulon was last week delivered by the Docteur battle fleet. The arsenal was bombarded from the high sea by the 13.4-inch guns of the *Bretagnes* and by the 6.1-inch weapons of the *Duguay-Trouin*, smoke screens being used in attack and defence. Seaplanes, combining their action with submarines, repelled the attack. There are lively moments, mimic warfare being a popular pastime among officers and crews. Whilst many officers hold that a battleship attack against a stronghold like Toulon would be a mad affair, others are of opinion that camouflage and cloud screens leave the way open for no end of surprises.

The year 1928 has been a record one for promotions: no fewer than eleven captains have been raised to flag rank and five rear-admirals have been made vice-admirals, which is the supreme rank in the French Navy. There will only be one vacancy to fill in 1929, so far as can be foreseen, viz., that of Admiral Fatou, who will reach the age limit in June next year. Thus there are poor prospects for officers of captain and commander rank and great dissatisfaction. Minister Leygues has selected rather young admirals, which makes the future still more gloomy for those capitanes de vaisseau impatiently fretting to ascend the ladder.

The New Super-Destroyers

Naval and Military Record, December 26, by J. B. Gautreau.—The six 2,480-ton destroyers (*D 4* to *D 9*) ordered at Lorient, Nantes, Dunkerque, and Havre) will, though lighter by 200 tons, carry an arma-

ment slightly superior to that of the completing *Lion-Verdun* class, while steaming 38 knots with 75,000 h.p., which is the highest power yet expected from vessels of that size. The new contretorpilleurs are destined for the Mediterranean, where they will excel 2,000 and 2,300-ton Italian destroyers. Their anti-aëriel defense has been looked after. In addition to screens over their funnels (4) and motors, and cloud-producing devices, they will mount five anti-aërial guns, besides machine-guns, all firing new-type projectiles, the efficiency of which was tested in the course of recent experiments at Toulon and in Brittany.

The *Guépard,* at Lorient, is preparing for her trials. Her Parsons turbines are expected to develop 70,000 h.p., which is 20,000 h.p. in excess of the nominal power of the 2,400-ton *Chacal* series that has been fitted exclusively with French turbines (Rateaus and Bleguets). She has been designed for 36 knots, but is expected to attain or exceed 36 knots on trials. Improvements to her boiler designs have been made by the Indret factory with a view to increased steam production, combined with economy. Among experts it is questioned whether the record (37 knots in choppy waters) of the Nantes-built *Tigre,* can be beaten, as the 2,690-ton boats have great width, together with enormous top hamper, though their funnels have been shortened. The fact is that the *Guépards* have cruiser proportions and freeboard, and offer a bigger target than British cruisers of the *C* class do. Italian ingénieurs, who are more parsimonious in their allowances of weights and anxious for stability and reduced target, have a tendency to consider that fighting power is being obtained more economically and more efficiently in the peninsula than in France. To such criticisms French experts retort that sea conditions in the Atlantic and in the Mediterranean are totally different, and, moreover, that France needs for the defence of her world interests vessels roomy, structurally robust, and provided with ocean radius of action, nearly to the same extent as Great Britain does, whereas Italy has merely to attend to Mediterranean requirements. Comparisons between French, English, and Italian boats are, therefore, usually misleading.

UNITED STATES

Vessels under Construction, United States Navy. Progress as of December 31, 1928.

Type Number and Name	Contractor	Per cent of Completion				Contract date of Completion	Probable date of Completion
		Jan. 1, 1929		Dec. 1, 1928			
		Total	On Ship	Total	On Ship		
LIGHT CRUISERS							
Pensacola (CL24)	New York Navy Yard	61.4	57.7	58.9	55.7	7/ 9/29	2/1/30
Salt Lake City (CL25)	American Brown Boveri Electric Corporation	71.8	71.1	69.1	68.6	7/ 9/29	12/1/29
Northampton (CL26)	Beth. S. B. Corp. (Fore River)	43.8	38.3	39.9	33.1	6/13/30	6/13/30
Chester (CL27)	American Brown Boveri Electric Corporation	42.7	42.1	39.2	37.5	6/13/30	6/13/30
CL-28	Puget Sound Navy Yard	18.5	16.3	16.	14.1	3/13/31	3/13/31
Chicago (CL29)	Mare Island Navy Yard	14.4	10.2	12.	8.4	3/13/31	3/13/31
Houston (CL30)	Newport News S.B. & D.D. Co.	39.7	34.4	36.4	30.6	6/13/30	6/13/30
Augusta (CL31)	Newport News S.B. & D.D. Co.	29.8	21.	26.2	19.1	3/13/31	3/13/31
FLEET SUBMARINES							
V-5 (SC1)	Portsmouth Navy Yard	48.5	44.7	46.1	42.2		3/ 1/30
V-6 (SC2)	Mare Island Navy Yard	40.5	33.6	38.3	31.		6/ 1/30

Authorized by Act of August 29, 1916, but no funds for construction appropriated:

12 Destroyers Nos. 348 to 359 inclusive.
1 Transport No. 2.
3 Fleet Submarines Nos. 169 to 171 inclusive.
1 Neff Submarine No. 108.

JAPAN AND ITALY

New Construction

Le Yacht, December 22.—Of the two new Italian 10,000-ton cruisers, the first ordered at Trieste will be called *Fiume;* the second, laid at the Odero-Terni yards, Spezia, will be called *Zara.*

The four destroyers forming part of the same section of the naval program (1928-1929) will be called *Dardo, Strale, Freccia,* and *Saetta.* The first two will be built at the Odero Yards, Sestri Ponente; the last two at the Cantiere del Tirreno, Riva Trigoso. These destroyers are to have a displacement of 1,450 tons and a speed of 38 knots. They are of the *Nembo* type improved.

The four submarines of 850 tons, ordered at the Cantiere Trientino, of Monfalcone, will have the names of *Squalo, Narvalo, Delfino,* and *Tricheco.* These ships will be like the *Bandiera.* They are intended to replace the old coast submarines of the F and H types.

On November 30, there was launched at Sasebo, a destroyer forming part of a group of twenty-four provided for the renovation of the Navy. They displace 1,700 tons, have a speed of 34 knots and are armed with six guns of 4.7 inches and nine torpedo tubes.

MERCHANT MARINE

The Shipping Conference

Washington *Post,* January 25.—What was acknowledged to be one of the largest and most successful meetings of shipping interests ever held in the United States was brought to a close yesterday in this city. Representatives of practically all the leading shipping organizations of the Nation attended the conference, which confined its attention solely to questions of major importance relating to water-borne commerce and foreign trade.

There have been other shipping conferences in the past. There will be others in the future. But the conference just closed will go down in history as the first concrete demonstration of the fact that, after a long period of uncertainty and doubt, the maritime interests of the United States are at last in general accord as to the best methods of developing the American merchant marine. The significance of this spirit of solidarity, arrived at in the face of the most serious obstacles, will not be lost upon the country generally, or upon Congress, or, for that matter, upon the foreign propagandists and others who have so consistently hampered the work of the Shipping Board and other protagonists of a strong shipping policy. At last the Government's efforts to foster a privately-owned merchant marine are being recognized and applauded by the private interests themselves, and both are now working shoulder to shoulder to achieve a common end, namely, to provide ships of a number and quality commensurate with America's standing as a world power.

Realizing the intimate relationship between naval and merchant vessels, each supplementing the other in all activities relating to the expansion of ocean-borne commerce and the development of trade-routes, to say nothing of national defense, the conference went on record as strongly indorsing the pending cruiser bill.

It was the sense of the conference that future meetings, similar to the one just closed, be held at least annually, and that the present organization be made permanent, as the best medium for aiding the Shipping Board in carrying out the maritime mandate of the American people.

ENGINEERING AND RADIO

The Explosion on the "Kungsholm"

Marine Engineer and Motorship Builder, January.—It will be recalled that an explosion occurred in the engine room of the Swedish-America Line's new motor liner *Kungsholm* when she was returning to the yard of her builders, Blohm & Voss, Hamburg, after completing her trials towards the middle of October last. A slight explosion occurred inside the engine crankcase, causing the sheet-iron crankcase doors on the starboard engine to be blown out on cylinders Nos. 3, 4, and 6. The vessel, it will be recalled, is propelled by two eight-cylinder four-stroke cycle double-acting Burmeister & Wain heavy-oil engines. This slight explosion was immediately followed by a very violent explosion. Flames shot out of the crankcase openings, spread aft through the engine room, around the starboard engine into the thrust recess and shaft tunnel. The explosion also extended, with some diminution of force, around the after end of the port engine and passed forward along the space between the two engines. The explosion was also felt in the bilges underneath the engine-room floor, part of the floor plating in the main engine room being lifted out of place. (An examination of the port main engine showed that the

steel plate lubricating oil trough underneath the bed plate was badly bulged, indicating that the force of the explosion underneath the floor had been severe.) The air displacement following the explosion was passed upwards to the engine-room casing, being sufficiently strong to lift the engine-room skylight and blow it overboard. Unfortunately, five men were fatally injured and nineteen others hurt more or less seriously. After the explosion the vessel returned to Cuxhaven with the port engine only in operation.

Subsequent careful examination of the starboard main engine of the *Kungsholm* by various experts, including representatives of Lloyd's Register and the British Corporation, indicated that the jockey sprocket used in the main duplex roller-chain camshaft drive had become overheated, the journals of the wheel having seized in their bronze bushes, which were a driving fit in the wheel with the additional security of a tap bolt. The seizure of the bushes sheared the bolts and allowed the wheel to revolve on the outside surface of the bushes; the heat thus generated had ignited the lubricating oil in the vicinity of the overheated wheel and the vaporized oil formed an explosive mixture with the air contained in the crankcase. This mixture was ignited by the burning oil which fell on the overheated bronze bushes.

The examination which was conducted by the various experts indicated that the main explosion had all the characteristics of being due to the presence of petrol vapor. It was ascertained at the inquiry held by the Deutsche Seeamt at Hamburg that the German workmen had used petrol for the purpose of cleaning the main lubricating oil filters. This was confirmed by an examination of the containers in which these filters had been cleaned, where a mixture of petrol and lubricating oil was found. It is worthy of note that although this undoubtedly undesirable procedure had been adopted, it is contrary to the practice of Burmeister & Wain, who supplied the main machinery. No special system for ventilating the engine room below the floor plates was, of course, fitted, and the petrol vapor formed during the cleaning of the comparatively large filter packs had settled at the lowest level in the engine room, namely, below the floor plates, where, unfortunately, the presence of this inflammable mixture was not detected by the engine-room staff.

Although it was the opinion of the various experts consulted that the use of petrol for cleaning the filters was the primary cause of the second and more dangerous explosion, the report of the official inquiry guardedly indicated that the presence of petrol in the engine room had not *definitely* been proved to be the cause of the second explosion. At the same time, the report expressed disapproval of the practice of cleaning lubricating oil filters with petrol and of storing them in ordinary unsealed containers. It was also suggested that the use of white metal for bearings in enclosed engines is to be recommended and that vapor pipes should be fitted to enable any undue heating to be detected. No blame was attached either to the ship's personnel or to the builders and designers of the ship or of her machinery. The damage to the engine room, it is worth noting, was not of a serious character and did not interfere with the vessel's initial sailing date.

New Transmitter for Destroyers and Submarines

New York *Times,* January 20.—The modernization of the radio equipment of all navy destroyers and light mine layers has been assured by the purchase of the latest transmitting apparatus, the installation of which is now well under way and should be completed by July.

A problem of immediate and pressing concern is to design and provide satisfactory apparatus for submarines of the S and R classes to bring their radio installations up to date. Owing to recent changes in requirements, it will probably be at least a year before the first complete equipments are sent out for their service trial. If they prove satisfactory, purchase in quantity will be made, according to reports from Washington.

A recent change in the characteristics of submarine transmitters will result in the diversion, to mine sweepers, of ten intermediate frequency vacuum tube transmitters originally purchased for submarines.

When the intermediate frequency tube transmitters for destroyers are delivered under contract commencing the first of this year, there will be available for installation on auxiliary vessels twenty-six of the older

model transmitters which are now installed on destroyer flagships. When this transfer of material is completed all of the large auxiliary vessels in active commission will be equipped with modern tube transmitters.

The Bureau of Engineering has a project under way for replacing the storage batteries used for emergency power on destroyers with gasoline driven generators. Eight additional new high frequency transmitters are now under contract.

Every effort is being made to obtain a new radio compass which will satisfactorily meet the very high standard demanded by the service for shipboard use. A sample compass designed at the Bellevue Laboratory and a modern commercial type compass were tested comparatively on the *Florida* and at Deer Island Radio Compass Station. Neither compass was entirely satisfactory, although both show considerable improvement over the types now used.

Two high power intermediate frequency transmitters are being delivered to the *Texas* and *California* for test. It is not certain that this high power will give a sufficiently greater distance to warrant the weight, space and cost of the transmitter, nor that so much power can be handled without insulation difficulties. Depending upon the results of this test, the bureau will either purchase additional high power transmitters for all battleships or will standardize on a lower power.

AVIATION

Thrust Horsepower and Engine Efficiency

Aviation, January, by Lieutenant Commander J. M. Shoemaker, U.S.N.—The several fundamental requirements of an aircraft engine have been discussed by many. The commonly accepted fundamental requirements, set down without reference to their relative importance, are:

1. Minimum weight per horse power.
2. Maximum dependability.
3. Maximum durability.
4. Maximum economy.
5. Minimum cost.
6. Maximum ease of maintenance.

In addition to the above requirements, I should like to present for consideration a requirement which, for want of a better name, I have called "Maximum effective thrust per horse power." "This requirement has to do with the effective thrust available in an aircraft power plant.

An aircraft engine's direct output is brake horsepower, while the output of the airplane power plant (which includes the propeller) is thrust horse power. The thrust horse power developed is, of course, dependent on the efficiency of the propeller used. The propeller should be so designed as to deliver the maximum thrust horse power possible with the given conditions. For purposes of comparison, it is assumed that this is the case,—that all the aircraft power plant types discussed have the most efficient propellers possible.

Aircraft engine design affects the effective thrust horse power in two ways—directly and indirectly. The direct effect is the speed of rotation at which the engine develops its power. The efficiency of a propeller increases with:

$$\frac{V}{ND}$$

where V = speed of advance of the aircraft, N = speed of rotation of the propeller and D = propeller diameter.

Hence, a high-speed engine with a propeller driven at crankshaft speed is less efficient than a slower turning propeller in the same aircraft. (The slow-speed propeller will be of slightly greater diameter, but the effect of change in r.p.m. will be much greater and hence the latter will have much more effect on propeller efficiency.) A high-speed direct-drive propeller may also suffer a loss of efficiency due to excessive propeller tip speed. There is very little definite information as to the tip speed beyond which propeller efficiency falls off, but we have not been far wrong in assuming that it is in the neighborhood of 900 feet a second.

We see that the effect of high crankshaft speeds is to lower thrust horse power directly due to its effect on the propeller

$$\frac{V}{ND}$$

and on propeller tip speed. Consequently, with high-speed engines it is necessary to incorporate reduction gearing between the crankshaft and the propeller shaft in order to reduce propeller speeds. This reduction gearing is an additional complication due

to its reduction of engine durability, dependability, and ease of maintenance and increase in engine weight per horse power and engine cost. In addition, the transmission of engine b.h.p. through gearing to the propeller shaft involves a slight loss in power, although this does not amount to more than a few per cent.

Until recently, American practice in the use of reduction gears was to employ a 2:1 reduction ratio. The latest idea as to the choice of a proper reduction gear ratio takes into account the increase in propeller diameter and propeller weight due to reduction gearing. The disadvantage of increased propeller weight is self-evident. Increase in propeller diameter, while maintaining the same ground (or structure) propeller tip clearance, not only requires additional weight of structure but the added length of supporting structure increases the parasite resistance of the aircraft. For these reasons, the latest practice in regard to reduction gear ratios is to choose one which will give a value of:

$$\frac{V}{ND} \text{ in excess of } 27$$

(where V = m.p.h., N = r.p.m., and D = ft.), and a propeller tip speed not greater than 900 feet per second. Working to these values will give a propeller efficiency somewhere near the maximum, and yet will insure that propeller diameter and weight are held to a minimum.

The indirect effect of engine design on the effective thrust horse power of an aircraft power plant is the drag (air resistance) of the engine as installed. The thrust of the propeller overcomes the drag of an aircraft, of which drag that due to the engine is an important component. So if the engine is of such a shape or size that its inherent air resistance is high, the effective thrust is proportionately diminished. One of the drawbacks of the radial engine is its high drag. This can be cut to a minimum by totally enclosing the engine with cowling, but with an increase in weight of structure and an evident sacrifice of visibility (in a single engine tractor installation).

The two factors—direct and indirect—which influence the effective thrust per horse power of an aircraft engine are themselves conflicting. An engine which is designed to develop a certain b.h.p. at high r.p.m. will be smaller and lighter than a larger displacement, slower turning engine of the same horse power, and its air resistance in flight will be less. The high-speed engine will probably require reduction gearing for the purpose of obtaining reasonable propeller characteristics, and this will add to the power plant weight and complication (and, in aircooled engines, will call for additional care to insure proper cylinder and oil cooling).

Aviation Accomplishments for 1928

Science News Letter, December 22.—The voyage of the *Graf Zeppelin*, with passengers and mail, from Friedrichshafen, Germany, to Lakehurst, New Jersey, established the practical value of transatlantic transportation lines.

The airplane *Southern Cross*, piloted by Captain Charles Kingsford-Smith and Captain C. T. Ulm, with Lieutenant Commander Harry W. Lyon as navigator and James Warner as radio operator, flew from Oakland, California, to Sydney, Australia, a total distance of 7,800 miles, in approximately 88½ hours flying time.

A transcontinental non-stop flight was made in 18 hours and 58 minutes.

Charles B. D. Collyer and John Henry Mears completed a trip around the world by airplane and steamer in the record time of 23 days, 15 hours and 8 seconds.

Captain Arturo Ferrarin and Major Carlo del Prete, flying a Savoia-Marchetti *S-64*, established a world's airline distance record of 4,466 miles in a flight from Rome to Brazil.

Captain Dieudonné Costes and Lieutenant Commander Joseph le Brix, French aviators, completed on April 14, 1928, a 35,000-mile trip around the world begun October 14, 1927, flying their Breguet XIX biplane the entire distance except for the trip across the Pacific Ocean.

Captain Arturo Ferrarin and Major Carlo del Prete gained the world's closed circuit distance record of 4,763.7 miles.

Johann Risztics and Wilhelm Zimmerman, flying a Junkers *W-33* established a world's duration record of 65 hours and 25 minutes.

Adjutant Louis Crooy and Sergéant Victor Gronen, flying a *DH-9*, established a world's duration record of 60 hours and 7

minutes, refueling in flight and returning to point of departure.

Eddie Stinson and George Haldeman, flying a Stinson-Detroiter, established a world's endurance record of 53 hours, 36 minutes, 30 seconds.

Major Arturo Ferrarin and Major Carlo del Prete, flying a Savoia-Marchetti plane, established a world's duration record of 58½ hours.

Harry J. Brooks, flying a Ford monoplane, established a world's airline distance record of 972 miles for light airplanes weighing 440-771 pounds.

M. Maurice Finat, flying a Caudron *C-109*, established a duration record of 24 hours and 36 minutes for light airplanes.

Major de Bernardi, flying a Macchi 52 seaplane, established a world's speed record of 318.62 m.p.h.

Peter Hesselbach remained aloft in his glider, *Darmstadt*, for 4 hours and 5 minutes, thus establishing an American glider record.

Juan de la Cierva flew his autogiro from London to Paris.

The rigid airship U.S.S. *Los Angeles* was successfully landed on the deck of the airplane carrier U.S.S. *Saratoga*.

The airship *Italia*, under the command of General Umberto Nobile was wrecked after successfully crossing the North Pole; Lieutenant Lundborg of Sweden rescued General Nobile from the ice floe where members of the *Italia* crew were stranded.

Roald Amundsen, arctic explorer, who set out in search of survivors of the wrecked airship *Italia*, was lost.

Eventual propulsion of aircraft by motors operating on heavy oil fuel and self-igniting on the Diesel principle was forecast by experiments with new type engines by the Junkers aircraft concern.

A "foolproof" airplane, designed by Albert A. Merrill of the California Institute of Technology and constructed by him in association with Dr. A. L. Klein and Dr. Clark Millikan, was demonstrated in Los Angeles.

A new altitude meter for airplanes was developed by Dr. E. F. W. Alexanderson of the General Electric Co.

By simply enclosing the ordinary air-cooled engine in cowling to reduce wind resistance, airplane speed can be increased about ten miles per hour, experiments by the National Advisory Committee for Aëronautics showed.

An automatic slotted wing device was invented in England by Handley Page to safeguard airplanes against stalling, nose-dives and tail-spins.

By a new process of electric welding, a new hollow-bladed propeller, made of special steel, was produced and put into use in navy airplanes.

Nine different types of airplane engines were approved as airworthy by the Department of Commerce during the year.

A device allowing an airplane to pick up a small consignment, such as a mail bag, from the ground while in flight was invented.

A device that simulates actual flying conditions and produces for the novice aviator the psychological effect of an airplane in motion was developed at the Wright Field Experimental Flying Station by Lieutenant Albert I. Hegenberger.

Contracts to build for the U. S. Navy two airships, the *ZRS-4* and the *ZRS-5*, each with almost twice the capacity of the German *Graf Zeppelin*, were signed by the Goodyear Zeppelin Corporation.

A widespread investigation of the lightning hazard to aviators was announced by the Daniel Guggenheim Fund for the Promotion of Aëronautics in conjunction with government air services.

A corporation called Transcontinental Air Transport was formed by leading railroads, airplane operators and builders for the purpose of creating joint air-rail services.

In military aviation, the accident rate for accidents due to engine trouble was reduced to one-third of the prevailing rate for the two previous years.

Air mail was more generally used as a result of lower postage.

Crankshaftless Engine Developed

Baltimore *Evening Sun*, January 4.—An airplane engine revolutionary in design and appearance, which has no crankshaft or valves and the pistons of which operate as shuttles to revolve a spiral cam on the propeller shaft, is under development here.

The engine, which weighs but 359 pounds complete, tests between 400 and 445 horse power with the shaft turning 1,200 revolutions a minute.

The idea of the engine grew out of trou-

ble experienced with valve and crankshaft engines by George E. Franklin, Miles City, Mont., the inventor, while he was a final-test mechanic for the Government at Detroit during the war. He began working on the design in 1919, in which year he obtained his first patents.

The air-cooled cylinders, sixteen of them, lie horizontally around an octagonal case, eight at each end. Two opposing cylinders are cast in a single barrel of aluminum alloy lined with steel.

On the inner side of the central section of the barrel is a slot through which a shaft and bearing deliver power from the piston rod to a spiral groove around a large cylindrical cam through which runs the propeller shaft.

The opposing pistons and rod connecting them are cast in one unit. At the center of the piston rod is attached the bearing shaft, which acts to the cam groove. As on piston fires, its opposing piston is on compression and fires immediately after the completion of the power stroke of its mate, giving a shuttle-like action.

Behind the cylinder case is the gear case, the distributors, the supercharger and carburetor. The engine is 48 inches long and 16⅜ inches in diameter.

Explaining the advantages of the engine, Franklin says the first has fewer working parts to wear out; smooth, vibrationless operation because of the cushioning of the power stroke at its end with the compression stroke of the opposing piston; less weight per horsepower, and compactness.

Every other cylinder of the engine may be removed and replaced with plates to make an eight-cylinder engine of approximately 200 horsepower.

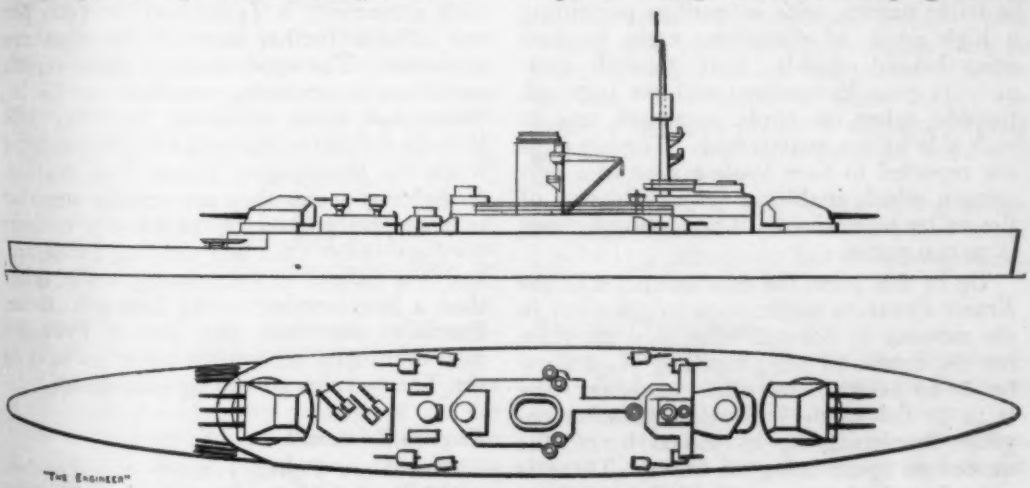
Franklin's work is being financed principally by Miles City citizens. He is assisted by John T. Sugars, also of Miles City, young mechanical engineer. Franklin was induced to come to Kansas City to build his engine through efforts of E. E. Porterfield, Jr., president of the American Eagle Aircraft Company, who believes in its possibilities.

Franklin says the engine probably will not be placed in a plane until next spring after thorough tests.

MISCELLANEOUS

The "Ersatz Preussen"

The Engineer, January 11.—In our review of naval construction during 1928, reference was made to the German armored ship, *Ersatz Preussen* (*i.e.*, replace ship for *Preussen*), which was authorized by the Reichstag last year and laid down at the Deutsche Werke, Kiel, in September. We are now able to give an amplified description of this truly remarkable vessel. There has been some debate in Germany as to whether she should be rated as a small battleship, an armored cruiser, or simply as an armored ship (Panzerschiff), which latter is the official designation. She is, in fact, a nondescript type, combining in some degree the offensive and defensive powers of a capital ship with the speed and sea-keeping endur-



PROFILE AND PLAN OF THE *ERSATZ PREUSSEN*

ance of a cruiser. In any case she represents an entirely new departure from current naval design.

With the exception of length, breadth, and draught, all essential particulars of the ship have now been released by the German naval authorities. As will be seen from the diagrams that we reproduce, from *Marine Rundschau*, she has rather fine lines, which seem scarcely adequate to support the relatively enormous weight of armament and armor that is to be carried. Restricted by Versailles Treaty rules to a displacement of 10,000 tons (which has, we notice, been interpreted in Germany as excluding fuel—or, in other words, as "standard" displacement), the German constructors have exhibited great ingenuity in economizing weight. The hull of the ship is composed of the highest grade steel, and wherever possible light metals have been substituted for steel in the general equipment of the ship. Thanks to these expedients a net saving of 550 tons has, it is claimed, been effected in the construction of the hull.

Protection is very complete. There is an end-to-end belt rising to a considerable height above the water line, many of the armor plates being incorporated as elements of the hull proper; double armor decks are worked over vital spaces, and extensive subdivision has been adopted as a defense against underwater explosions. The freeboard is comparatively lofty, and the guns have a high command, which should enable them to be fought in rough weather. The main armament consists of six 11-inch guns in triple turrets, with mountings permitting a high angle of elevation; eight 5.9-inch guns behind shields, four 3.4-inch anti-aircraft guns in tandem; and six 19.7-inch torpedo tubes on triple carriages, one at each side of the quarterdeck. The big guns are reported to have loading gear of a new pattern which enables a very rapid rate of fire to be maintained. Their utmost range is 30,000 yards.

Up to this point the characteristics of the *Ersatz Preussen* might seem to place her in the monitor or coast-defense ship category, but the details of her propelling plant show her to be designed for other purposes. She is to be driven by internal-combustion engines developing up to 50,000 b.h.p., the maximum speed being 26 knots. There is a good deal of mystery about these motors, which were designed by the engineering staff of the German Admiralty after a prolonged and costly series of experiments, and are now being constructed in the shops of the Maschinenfabrik Augsburg-Nürnberg. They appear to represent a great advance on existing internal combustion practice, since it is officially stated that they develop a unit of horsepower for every 17½ pounds of weight. As the latest M.A.N. engines of which we have cognizance have a weight of 55 pounds per b.h.p., it is clear that the design of the new Admiralty type must possess some very novel features, the disclosure of which will be awaited with keen interest by the engineering world.

The *Ersatz Preussen* is to carry sufficient fuel for a continuous voyage of 10,000 miles at a speed of 20 knots. Were not these figures vouched for by the German Admiralty, they would be almost incredible. We need hardly say that no vessel now afloat, whether man-of-war or liner, is able to steam anything like that distance at the speed stated. Our latest *County* cruisers have a maximum endurance of 10,400 miles, but only at an economical speed of about 13 knots. What the extreme radius of the *Ersatz Preussen* may be at economical speed can only be conjectured, but it may be as much as 18,000 miles.

All things considered, the German constructors have produced a noteworthy ship, the completion of which bids fair to mark an epoch in naval design. She will be unique in many ways, not least in respect of cost, since the estimate for the ship, complete with armament, is £4,000,000, or £400 per ton. Three further units of the class are projected. The appearance of these vessels may have far-reaching reactions on the international naval situation, for they will introduce a factor that was not contemplated when the Washington Treaty was drafted. In fighting power they are greatly superior to the Treaty class of 10,000-ton cruiser, they are faster than any existing battleship, and it is difficult to see how any vessel other than a battle-cruiser could deal with them. Possibly, therefore, the *Ersatz Preussen* may eventually necessitate some revision of the Treaty rules governing ship design.

English Comment

New York *Times*, January 30.—London. —While the United States and England

have been discussing the thorny issue of the construction of 10,000-ton cruisers armed with 8-inch guns, is it not possible that Germany has now robbed that discussion of much of its import?

This question is being studied in both Admiralty and government quarters here and the answer to that study may well influence the future position of the American and British naval experts.

For while America and England have been figuring on how many "treaty" cruisers they might or might not build, Germany, which is not bound by the Washington naval treaty since she was not a party to it, has evolved *Panzerkreuber A.* According to the German Defense Minister, General Groener, this ship is far superior in combat powers to the cruisers England and America are now building. And so naval experts are asking what will be the good of 10,000-ton cruisers with 8-inch guns if there exists a 9,000-ton cruiser with 11-inch guns, which, although its heavy armor slows its speed, could, it is figured, blow to bits any delicate 10,000-ton craft with only 8-inch guns.

The naval expert of the *Daily Telegraph* sums the situation up as follows:

> The German production promises to stultify the regulations of the Washington treaty. These bind the signatory powers—with the exception of France and Italy—to build nothing between 10,000-ton cruisers and 35,000-ton battleships as the *Ersatz Preussen* mounts six 11-inch guns and as stoutly armored she could blow any cruiser with 8-inch guns out of the water.
>
> It seems inevitable therefore, that the German type of ship will upset the balance of power which the treaty was designed to stabilize.

In his secret report to the Reichstag General Groener said of the new German ships:

> They are built for high rate and long enduring speed and are capable of coöperating tactically with cruisers and engaging a superior foe at the right moment. Their fighting strength is far above that of the 10,000-ton cruisers.
>
> They are dangerous opponents even for big battleships. The range of their guns is seven and a half miles longer than that of the heavy guns of our old battleships and they can fire thrice the weight of metal per minute. Their invulnerability to submarine or aircraft attack has been greatly increased by a new kind of armoring and arrangement of compartments below the water line.

That the Germans must have a great deal of new and costly equipment on the ship is indicated by its cost of more than $20,000,000, as compared with $10,000,000 for the treaty cruisers built by England and $16,000,000 for treaty cruisers built by America.

Commenting on the alleged weaknesses of the treaty cruisers, Hector Bywater, the famous English naval expert, writes:

> From the tactical point of view, this type perpetuates in aggravated form the weaknesses of our early battle cruisers, which fared so ill at Jutland, in that everything was sacrificed to speed and armament, leaving the ship itself almost defenseless against a counter-attack. Their armor protection was so scanty that even small-caliber shells could penetrate to their vitals.
>
> Sir George Thurston, one of our leading naval designers, has said:
>
> "The interior of such a cruiser is so fully occupied by boilers, machinery and magazines that it is not humanly possible to provide by bulkheads, watertight compartments or other methods of under-water protection, immunity from a mine or a torpedo attack. It must be recognized that the explosion of a mine or torpedo would in the large majority of cases utterly wreck and destroy the vessel."
>
> Such are the costly and brittle ships which the international naval experts in their wisdom have substituted for the smaller, cheaper and relatively more robust type of cruiser that answered all requirements prior to 1922. A duel between treaty cruisers would probably end as did the Kilkenny cat fight. Why, then, should we build these dangerous, vulnerable ships?

The question, then, arises whether after development of the submarine the Germans have not given the world one more contribution to the noble art of self-defense. And there follows the question of what shall be done about it.

There will probably be forthcoming studied opinion from naval experts during the war. Will the result be a revision of the ideas of English and American experts as to the value of 10,000-ton cruisers with 8-inch guns, about which there has been so much debate in the last two years? Or will Germany be invited to come within the peaceful confines of the Washington treaty and build only well-behaved ships, fashioned according to Hoyle?

In that case it will be interesting to see the price Germany asks. And she will ask a price if it proves she has something worth while.

American Comment

New York *Times*, January 31.—Washington.—The concern manifested in England over the new 9,000-ton cruiser, heavily armored and equipped with 11-inch guns, which Germany has evolved, is not shared in naval circles here.

At the Navy Department today it was said that no information concerning the German cruiser had been received beyond that contained in various press dispatches from Europe and in the standard naval publications recently issued in European capitals.

There was no effort in official circles to discount the contribution made by Germany to naval science in the development of the new type of cruiser, but it was asserted that this was the product of special conditions and directed at a situation foreign to the United States.

The new German cruiser, it was pointed out, would have heavier armor and guns than the American 10,000-ton ships, but the vital consideration from the American point of view was that it would have much slower speed as a result. As considered here, the vessel is essentially an offensive craft, whereas the United States needs cruisers for the protection of its commerce and as eyes for the fleet.

The German cruiser might crush an American cruiser, it was added, but it would have to catch it first.

The speed of the German craft is understood here to be about 26 knots, while the cruisers contemplated in the program now before the Senate will have a speed of about 33 knots.

The greater hitting power of the German ship, it was argued, was a result of the handicaps under which Germany has been laboring since the war. Unable, under the Versailles Treaty, to have the great battleships which are considered the backbone of naval power by other nations, it has produced an auxiliary craft of maximum striking power, but still no match for a battleship.

Since the United States is bound by the Washington treaty to limit its cruisers to 10,000 tons with 8-inch guns, it has made no effort toward developing larger craft and heavier guns for that type of ship. It has continually endeavored to improve the design of engines, however, to increase their power and reduce their unit weight to permit heavier armament and greater fuel capacity. These elements would provide greater security, higher speed and longer cruising radius.

Discussion by Captain Dudley W. Knox, U.S.N. (Retired)

Baltimore *Sun*, January 24.—Washington, January 23.—*The Sun* recently published two exceedingly interesting accounts by Mr. Bywater, the well-known British writer, of the new type of "pocket battleship" which the Germans have evolved and are about to build under the severe handicap with respect to size imposed by the Treaty of Versailles. Mr. Bywater expresses the opinion that "no navy, however numerous and powerful, which was regulated by the Washington treaty, would be able to cope with an *Ersatz Preussen* (the projected German battleship) if the latter were sent on a roving commission to roam the seas at large and prey upon shipping."

This opinion is open to serious question, as is also the suggestion which has come from certain American quarters since the publication of Mr. Bywater's articles, that the appearance of the new German type casts doubt upon the wisdom of our continuing to build the treaty type of cruisers, provision for fifteen of which is contained in the "cruiser bill," now before the Senate. The very opposite is true. The need of the United States and all other signatories to the Washington Conference for more "treaty" cruisers would be enhanced rather than diminished by the construction of *Ersatz Preussens* by the lesser naval powers.

It must be conceded that the "pocket battleship" will be difficult to deal with when engaged in commerce raiding. Her great cruising radius, gained largely through the development of a new type of internal combustion engine, will enable her to go great distances and to keep the sea for long periods of time without frequent refueling from a shore base or supply ship. Her reported speed of twenty-six knots is sufficient for her to keep out of range of most capital ships. Her battery of six 11-inch guns is considerably more powerful than the 8-inch battery mounted on the "treaty" cruisers, which possess ample speed to catch the "pocket battleship."

Thus the new type is represented as more powerful than ships which can catch her, and too speedy for ships which can fight her successfully. This is the kernel of the superficial claim that her advent introduces an unsolvable problem for the five great powers, which under the terms of the Washington

treaty have severely limited their capital ships and airplane carrier strength and have placed restrictions upon the individual size and battery of cruisers which are not limited as to numbers.

The British possess nine capital ships whose maximum speeds range from 32 to 25 knots. These ships are so large and heavy that even the slower ones should be able to run down the new German type of only 10,000 tons displacement in a moderate sea, since the normal wave action will prevent the comparatively light German from making good her theoretical twenty-six knots.

The Japanese have four capital ships in a similar category. We have none whose speed exceeds twenty-one knots. Under the provisions of the Washington treaty, however, we are committed to the laying down of two capital ships before December 31, 1931, as the commencement of a replacement program to take care of inevitable obsolescence.

The other signatory powers are similarly committed, and since the "treaty" battleship may be as large as 35,000 tons there will be no difficulty in giving them sufficient speed to catch the pocket battleship without, at the same time, making the drastic sacrifices which the latter is forced to, in respect to gun power, armor and protection against torpedoes, mines and aircraft.

That the case for the pocket battleship is overdone is also evident from the fact that the Treaty of Versailles limits the Germans to only eight of these small capital ships, as compared with the Washington Conference limit of fifteen much larger and more powerful battleships for Great Britain and ourselves.

However, eight small German-type battleships scattered over the trade routes of the world could not well be run down without sufficient time to prevent grave damage to maritime commerce by so few a number as fifteen "treaty" battleships—no matter how large, powerful and speedy the latter might be. The protection of great areas of ocean requires the dispersion of reasonably numerous individual units. Here is where the cruiser becomes necessary as an adjunct to battleships and other forms of naval power.

How could a considerable number of so-called "treaty" cruisers, substantially faster, but much weaker in gun power than the pocket battleship, defeat eight of the latter type widely scattered on a commerce raiding mission? Mr. Bywater assumes the problem unsolvable merely because if the cruiser found the battleship it "dare not engage her" and others assume that on this account it is futile for us to continue building such supposedly worthless cruisers.

The problem is as old as the hills. Its solution cannot be reduced to such simple terms. It takes us out of the realm of design, and the theoretical matching of a single ship against a single opponent, into the field of strategy and tactics where all of the various types of ships and weapons at one's disposal are brought into play to accomplish a necessary object.

If a single cruiser "dare not engage" the pocket battleship two cruisers may—if not two, then three—or else two with home submarine, destroyer or aircraft support. In the background we have always the tremendously powerful super battleships, which may be brought to the fray unseen by the "pocket battleship" through information radioed from the cruiser, which, even if too weak to fight, is still fast enough to keep touch at a safe range.

It is quite within reason that even a single cruiser might engage a pocket battleship with fair success—let us say damage her sufficiently to prevent further raiding until extensively repaired. Modern gunnery is so vitally dependent upon airplane spotting that if the 10,000-ton cruiser can carry on her decks air power superior to that carried by the 10,000-ton battleship and gain command of the air, the cruiser would be in a position to win a gunnery duel.

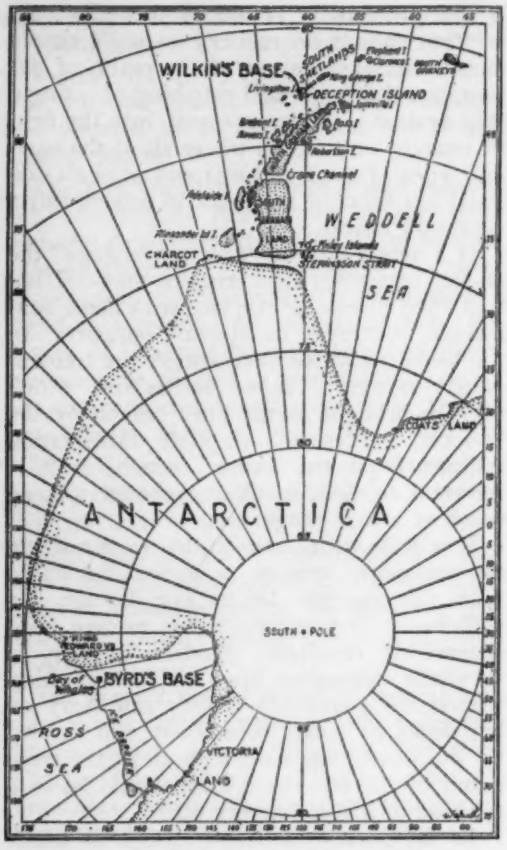
In the pocket battleship design so much has evidently been sacrificed to enhance her gun power and probably her armor protection that her air power may be less than that which can be carried by the "treaty" cruiser.

In any event, the advent of the pocket battleship is a strong reason for those nations such as the United States which are prevented by treaty from building that type, turning to the construction of more cruisers of the most powerful type which their treaty commitments allow.

Wilkins's Flight

New York *Times*, January 12.—Captain Wilkins has done what few men of his generation have been permitted to do: he has

changed the face of the known earth. Until a few weeks ago a peninsular arm was shown in all modern maps and globes, extended from the Antarctic toward South America, as if it had once had hold of that tapering continent from which it is now separated by a few hundred miles—"an arm



SCENE OF WILKINS'S FLIGHTS IN THE ANTARCTIC

Leaving his base on Deception Island, he flew over Graham Land, discovering that it was two islands and not part of the great Antarctic Continent, but being unable to find a new base there for his proposed 1,800-mile flight to Ross Sea, which Commander Byrd is penetrating, he decided to return to America and plan for another expedition next year. Map is based on data discovered by Sir Hubert and bears names he gave to places.

with Andean structures and affinities," as Dr. Bowman has described it. Captain Wilkins has cut the peninsula into two major islands and separated it by a strait some forty or fifty miles wide from what is supposed to be the mainland of Antarctica. His discoveries have not only changed the world's maps, but they have made it necessary to change his own plans and establish a new base. If Graham Land had been, as was supposed, a peninsula, he might have gone on further into Antarctica without too great risk of return.

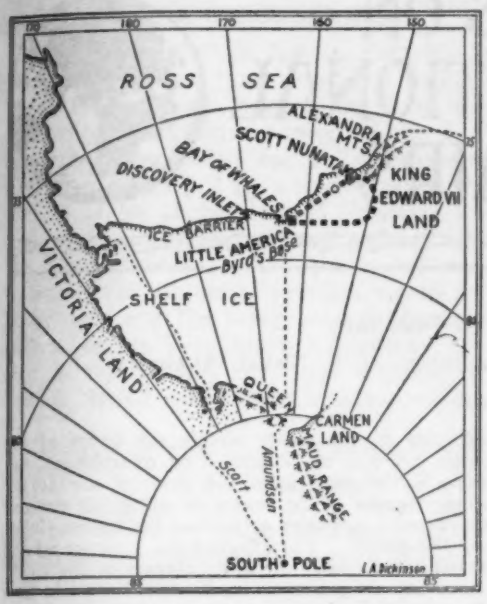
He has shown the better part of valor in reorganizing his own expedition, in view of these stretches of water that shut the great white castle away as if it were surrounded by moats to which there were no drawbridges. If he had flown over the moats and reached the interior of the mountainous castle, it might have become a castle of despair; for if his plane had failed, he and his companions would have been doomed to an early death.

His expedition was, however, not primarily for geographical exploration, but for the location of stations for meteorological observation; this ultimate object being to study the habits of the cyclonic storms of the Antarctic and so to forecast the periods of drought in the continents that look toward the South Pole: South Africa, South America and Australia. He has taken a long step toward this goal, but his purpose might have been defeated if he had ventured further from his first base.

This achievement has added a lustre to a fame already secure. Those also are to be congratulated who sponsored and made possible this expedition which has both altered the map of the world and promised a greater good to mankind.

Byrd's Flight

New York *Times*, January 29.—Commander Byrd in his flight into King Edward VII Land did not expect to make important geographical discoveries. He is familiar with Scott's description of what he saw of the region—a glacial desolation rising to Nunataks and the appearance in another direction of a low range of mountains. Scott made no exploration, but Lieutenant Prestrud of Amundsen's expedition of 1910-1912 penetrated King Edward VII Land for a distance of 300 miles. He raised the Norwegian flag on one of the Nunataks, and beheld from a distance the Alexandra Mountains along the coast. He concluded that the range was twenty miles in length. Prestrud had two companions and traveled with dog sleds. Of the Alexandras the Norwegian reported: "It could not be called an imposing range, and it was snowclad



BYRD'S FLIGHT OVER ANTARCTICA

Leaving the base at the Bay of Whales, Commander Byrd flew northeast along the coast to the Alexandra Mountains, then turned south and circle over King Edward VII Land, returning to the base over an inland course. He estimated that he viewed about 10,000 square miles of unexplored territory on the trip, which took about five and one-half hours.

from one end to the other. Only on the most easterly spur was rock just visible."

Prestrud was away from the base at Framheim thirty-eight days of the Antarctic midsummer. Commander Byrd covered more territory in his airplane in about five hours. Prestrud encountered unusually heavy snowstorms. Commander Byrd selected a day of blue skies flecked with white, and made a survey of many more leagues of King Edward VII Land than were within the vision of his predecessor. There has been speculation whether King Edward VII Land is an island or a part of the mainland. To decide this question would be an achievement for Commander Byrd. It may be supposed that his excursion on Sunday was a first reconnaissance. With the arrival of the *Eleanor Bolling* the testing of his four planes can be done methodically.

A dash to the Pole, 850 miles by the Amundsen route, stands high on the Commander's program, and he expects to fly even beyond the Pole. Such an enterprise would require careful handling, because relief in the event of an accident would have to be provided for. Airplane expeditions are likely to be confined to the brief summer. The rigors of winter, temperatures of more than 70 degrees below zero and blizzards lasting for days make flying a serious hazard. The preliminary flight into King Edward VII Land again proved the excellence of Commander Byrd's radio equipment. Except in the event of tempestuous weather he should be able to keep in close communication, measured by minutes and even seconds, with the New York *Times*.

CURRENT ARTICLES AND BOOKS

"The Foreign Policy of Nationalist China," by George E. Sokolski in *The Far Eastern Review*, December.

"World War Under Water," the first of a series of articles by Lord Jellicoe, Admiral Lacozi and Admiral Von Tirpitz in *The Sphere*, beginning December 8.

"Europe: A History of the Past Ten Years"—by R. L. Buell.

"American Foreign Relations, 1928"—by P. H. Howland.

"Wireless Direction Finding and Directional Reception"—by R. Keen.

"Mastery of the Pacific: a survey of naval power in the Pacific"—by Sir F. Fox.

"U. S. in the Air: a Review of the Last Ten Years"—by M. M. Patrick.

"American Policy Towards Russia Since 1917"—by F. L. Schuman.

"The Real Situation in Russia"—by Leon Trotzky.

"Daily Maps of World Weather: An Attempt at Three-Dimensional Geography"—by Alexander McAdie in *The Geographical Review* for January.

NOTES ON INTERNATIONAL AFFAIRS

From January 4 to February 3

Prepared by Professor Allan Westcott, U. S. Naval Academy

PEACE PACT RATIFIED

Senate Approves.—After considerable and heated discussion which showed clearly that it was only the very innocuous character of the Kellogg-Briand Peace Treaty that made its acceptance possible, the Senate ratified the treaty on January 15 by a vote of eighty-five to one. No reservations were made, but this was accomplished only by a compromise which made the Senate Foreign Affairs Committee report on the treaty, a kind of interpretive document. This was brought about by adding a clause to the report stating that the report gave what "your committee understands to be the true interpretation of the treaty." Thus, although the report was not voted on, or in any way directly attached to the pact, it may be used in future to explain what the Senate took the treaty to mean.

The report included the following statement:

> The committee reports the above treaty with the understanding that the right of self-defense is in no way curtailed or impaired by the terms or conditions of the treaty. Each nation is free at all times and regardless of the treaty provisions to defend itself, and is the sole judge of what constitutes the right of self-defense and the necessity and extent of the same.
>
> The United States regards the Monroe Doctrine as a part of its national security and defense. Under the right of self-defense allowed by the treaty must necessarily be included the right to maintain the Monroe Doctrine, which is a part of our system of national defense.

Then comes an interpretation of the Monroe Doctrine quoted from Woolsey's *International Law*. The report ends as follows:

> The committee further understands the treaty does not provide sanctions, express or implied. Should any signatory to the treaty or any nations adhering to the treaty violate the terms of the same, there is no obligation or commitment, express or implied, upon the part of any of the other signers of the treaty to engage in punitive or coercive measures as against the nation violating the treaty. The effect of the violation of the treaty is to relieve the other signers of the treaty from any obligation under it with the nation thus violating the same.
>
> In other words, the treaty does not, either expressly or impliedly, contemplate the use of force or coercive measures for its enforcement as against any nation violating it. It is a voluntary pledge upon the part of each nation that it will not have recourse to war except in self-defense, and will not seek settlement of its international controversies except through pacific means. And if a nation sees proper to disregard the treaty and violate the same, the effect of such action is to take it from under the benefits of the treaty and to relieve the other nations from any treaty relationship with the said power.
>
> This treaty in no respect changes or qualifies our present position or relation to any pact or treaty existing between other nations or governments.

Other Ratifications.—President Coolidge and Secretary Kellogg affixed their signatures to the instrument of ratification of the Peace Treaty on January 17 in a brief but impressive ceremony at the White House. At that date the United States was the only one of the fifteen original signatories to complete ratification. Thirteen other countries, however, had previously ratified the treaty, including notably the Soviet Republic, and others had expressed their decision to do so. From England came word at the close of January that ratification would be completed as soon as all the dominions had communicated their approval. Chili, Argentina, and Brazil were the only nations which at the time had taken no affirmative action regarding the treaty.

NAVAL DISCUSSIONS

GIBSON TO DISCUSS NAVAL POLICY.—It was announced on January 28 that Ambassador Hugh Gibson, head of the American delegation at the next session of the Preparatory Commission for a Disarmament Conference on April 15, would return to the United States at the close of February for a discussion of American naval policies with the new administration. It was believed, however, that the naval problem would not be brought into the foreground at the next session of the Preparatory Committee, except in the unlikely case that England or France should make some new suggestion.

FREEDOM OF THE SEAS.—There has been of late a rapidly growing realization that behind the dispute between the chief naval powers over cruiser ratios lies a much deeper and more long-standing divergence of policy over the control of commerce in time of war. It is true that in the Civil War and again after American entry into the World War, the United States went as far as England in enforcing naval control of neutral commerce with the enemy, and Admiral Mahan always insisted that the use of naval power in this manner was not only the most effective but also the most humane method of waging war. Nevertheless, when the United States is neutral she has always come back to her old policy embodied in the slogans of 1812, "free ships make free goods," and "freedom of the seas." This was seen in President Wilson's proposal, as one of his "Fourteen Points," that there "shall be absolute freedom of navigation upon the seas outside territorial waters [the old three-mile limit, not the present one of twelve miles or more necessitated by prohibition enforcement], alike in peace and in war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants." To this Premier Lloyd George could not consent, and he added that it would do no good if he could, for the idea was contrary to the fixed principles of the British people. President Wilson perforce had to drop the point, determining meantime to build our Navy up to England's and consoling himself with the idea that when the League began to function there would be no neutrals anyway. But when the United States failed to join the League, the old question of neutral commerce in wartime remained unsolved.

It was a realization of this situation that suggested Senator Borah's amendment to the Cruiser Bill stating that "the Congress favors a restatement and recodification of the rules of law governing the conduct of belligerents and neutrals in war at sea on the basis of the inviolability of private property theeron."

Of special interest therefore are two discussions of "Freedom of the Seas" in the February *Times Current History Magazine*, one by an Englishman, former editor Wickham Steed of the London *Times*, and the other by Professor J. T. Gerould of Princeton. As a pronounced anti-militarist, Mr. Steed does not present the British case very vigorously. He points out truly enough that no real difficulties exist in time of peace, and that they would arise in time of war only in two types of situations: (1) a war made by the League to enforce its will on some unruly nation, in which the United States would be neutral; (2) a limited war between any two nations or small groups of nations. The first situation he thinks is greatly eased by the Kellogg Treaty or Pact of Paris, which he considers as really a promise made by the United States to League members "lessening the probability" that she will ever invoke freedom of the seas against coercive measures undertaken by the League. In view of this changed situation, he would now favor acceptance of President Wilson's point as stated above, omitting only "alike in peace and in war."

Professor Gerould in his article traces American policy from 1812 on, rather slighting the strong measures the United States has taken at times against neutrals. He ends by saying that the potency of naval predominance to protect commerce has been largely upset by submarines and aircraft, that cruisers are of little value for this purpose, and that Great Britain would hence be wise to adopt the American point of view and seek safety for her commerce, not in a navy, but in an agreement. He then quotes a proposal recently made in the *Survey of American Foreign Policy*, edited by C. P. Howland, as follows:

> Mr. Howland and his associates suggest an agreement between the British and the American Governments which would provide: "(1) The contracting parties agree not to interfere with neutral non-contraband commerce at sea in case of

a private war; (2) the contracting parties will not insist on the traditional rights of neutral trade in case of a public war." Such an agreement would involve concessions on both sides, but in either case they would be immaterial in comparison with the resulting gain. While the first of these basic agreements would satisfy practically the whole of the traditional American contention, it would only become operative when the efforts of the League to prevent war have failed. The second would pledge us not to become the economic ally of a nation that had violated the obligations it had accepted in becoming a member of the League. It would extend only by a very little the implications of the General Pact for the Renunciation of War. Such an agreement would call for a clear definition of contraband and a pledge that the list will not be summarily extended during the progress of a conflict. There should be as well a formulation of the principles under which such contraband is forfeit.

Should it be possible to effect an agreement such as this, the problem of naval disarmament would become relatively simple, for the major reasons for which navies exist will have disappeared. That there would be objection to it on the part of other Powers seems hardly possible and it might very readily be converted into a multi-lateral pact. It remains to be seen whether there is enough of statesmanship on both sides of the water to bring it into reality.

For this idea of trusting safety of commerce to a treaty there seems to be also some favorable sentiment in England, as expressed in editorials in the Manchester *Guardian* (January 28) and in speeches in Parliament by Commander Kenworthy. But other Englishmen wonder, if England went to war with some European power and her commerce were attacked, what the United States would do to protect it.

GERMAN VIEW OF FUTURE WAR.—The possibility of a new factor in the cruiser controversy was suggested by Germany's latest design for a 10,000-ton cruiser, carrying, with other armament, six 11-inch guns. In advocating the construction of a number of cruisers of this type, Defense Minister Groener issued last November a memorandum intended only for German political leaders, but subsequently published in England. It read in part thus:

Developments of the last few weeks reveal as if by search-light the future grouping of powers around England and France on the one hand, and America on the other. The fighting out of these antagonisms is only a question of time, and Germany, a people of sixty millions in the heart of Europe, runs the gravest danger of being drawn into the struggle. If we do not intend our neutrality to be violated, and that conflict fought out on our territory, we shall be compelled to defend it in arms.

The tension between Czechoslovakia and Italy, between Italy and Jugoslavia, between Poland and Lithuania—with Russia in the background—has left Europe no peace. The antagonism between England and Russia is notorious. If we do not intend that the belligerents should ruthlessly ignore our many-sided economic and cultural interests, which extend beyond our frontiers, we must put ourselves in a position to uphold our rights with weight. This eventually must be soberly pondered. . . . .

REPARATIONS CONFERENCE

AMERICAN DELEGATES SELECTED.—In the middle of January came the final selection and formal notification of the American delegates on the Commission of Experts set to meet in Paris in February to determine the total amount and duration of payments of German reparations. The American delegates are J. P. Morgan, of the Morgan Company, New York, and Owen D. Young, Chairman of the Board of Directors of the General Electric Company and former American delegate on the committee which drew up the Dawes Plan. Mr. Thomas W. Lamont of New York and Mr. T. W. Perkins of Boston were named as alternates. The chief delegates with their staff sailed for France on February 1. Although President Coolidge had made some objection to the appointment of an American as chairman of the present commission, it was still hoped in Paris that Mr. Young would accept this office.

The chief event of the month bearing on the work of the commission was the publication early in January of the annual report of Agent General of Reparations S. Parker Gilbert, which stated flatly that there could be no doubt of Germany's ability in the future to make the standard annual payments (2,500,000,000 gold marks or about $600,000,000), provided under the Dawes plan. This was good news to the Allied Governments and aroused much resentment in Germany, where efforts were at once instituted to collect evidence in refutation. Germany would also like to limit payments to not more than thirty-seven years, whereas the Allied Goverments demand their duration for the same period as that of the Allied debts to America, or about sixty years.

UNITED STATES AND LATIN AMERICA

ARBITRATION AND CONCILIATION PACTS.—The arbitration and conciliation treaties

prepared by the special Pan-American conference of experts in Washington were approved and signed at the final session on January 5 by delegates of the twenty nations represented. Canada and Argentina were the only American countries who did not send delegates. Of the twenty nations which signed the two treaties, only seven did so without reservations—the United States, Panama, Cuba, Brazil, Peru, Hayti, and Nicaragua. The chief reservation was that made by several nations against arbitration of pecuniary claims by foreigners. Other reservations were more temporary in character reserving from arbitration boundary and other disputes which had arisen prior to the present treaty. The two agreements were published in full in the New York *Times* of January 4, and were summarized in these notes in last month's issue of the PROCEEDINGS. They provide peace machinery which will apparently make war extremely difficult between American nations, though they in no way prevent the revolutionary struggles which more frequently trouble the Latin-American countries, nor do they prevent the intervention to which such conflicts give rise. Apparently the intervention question was completely avoided.

BOLIVIA-PARAGUAY ACCORD.—The conciliation protocol between Bolivia and Paraguay was signed by diplomatic representatives of the two nations at Washington on January 3. As finally arranged, the Investigating Commission will be composed of two delegates each from the disputing nations, and one each from the United States, Mexico, Cuba, Uruguay, and Colombia. Argentina and Brazil had previously declined to serve on the commission, Brazil explaining that her contiguity to the territory in dispute and her recent settlement of boundary questions with both Bolovia and Paraguay would render her action as an arbiter embarrassing. The commission will attempt, first, to fix the blame for rupture of peaceful relations, and second, to submit plans for peaceful settlement. It will not decide the boundary dispute itself.

WAR ON SANDINO.—On January 15, President Moncada of Nicaragua announced the decision of his government to to take a hand in the suppression of General Sandino by sending well-equipped forces into the northern provinces. This decision followed Sandino's proposal through emissaries that Nicaragua be divided into two separate countries, the northern part under his control.

ITALY AND SOUTHERN EUROPE

ITALO-PAPAL CONCORDAT.—Reports from Rome in the middle of January gave the terms of an agreement practically completed between the Italian Government and the Vatican. The main points of the proposed concordat are: (1) payment by Italy to the papal treasury of 1,000,000 gold lire for seizure of church property since 1870; (2) cession to the Holy See of a small plot of territory in the region west of the Vatican; (3) retention by the Italian Government of certain property in this district for purposes of civil administration and police control; (4) resumption of diplomatic relations and exchange of envoys. The treaty if concluded, will end the long *impasse* between the Pope and the Government of Italy, and the Pope as ruler of a small state within a state will again have recognized temporal power, and be no longer the "prisoner of the Vatican."

SPANISH REBELLION SUPPRESSED.—The most serious revolt since that of September, 1926, against the De Rivera dictatorship in Spain broke out on January 29, but, according to a statement of the Premier before the National Assembly, was suppressed without serious consequences. Though planned by politicians outside Spain, the plot was hatched in the army, and found its only open manifestation in an artillery regiment at Cuidad Real, about 100 miles from Madrid. There were later reports of numerous arrests in various parts of the country.

DICTATORSHIP IN JUGOSLAVIA.—On the night of January 5, King Alexander of Jugoslavia, issued a decree dismissing the *Skupshtina* (Parliament), suspending indefinitely the Constitution of 1921, adopted at the formation of the Kingdom of the Serbs, Croats and Slovenes, and taking over for himself full dictatorial powers. A new cabinet was appointed by the King, headed by General Zirkovitch, commander of the

royal guard. Five Croats were included among the fourteen members of the cabinet. All self-governing bodies were abolished, local control being vested in governors except in the cities of Belgrade, Zagreb, and Laibach, which will have municipal councils.

This action was forced on the King by the persistent refusal of Croatian political leaders to have anything to do with the existing parliament or to accept officials appointed by the Koroshetz Ministry, formed last July. Premier Koroshetz resigned on January 2, and the dictatorship became inevitable. On January 13, Premier Zirkovitch issued a brief statement that the new government was only temporary and a return to democratic methods was anticipated. Although at first Croatian leaders expressed approval of the change, they were chagrined later to find that their party headquarters at Zagreb were occupied by the police, and that "all political parties were terminated." As an earnest of good intentions, King Alexander on January 17 issued orders for the drawing up of a new constitution. This will prove a difficult task, for both the Croats and Slovenes are insistent on complete home rule.

ITALY AND JUGOSLAVIA.—The crisis in Jugoslavia preceded by less than a month the expiration of the treaty of friendship with Italy, and no steps were taken for its renewal. Fears were expressed that by her treaty agreements with Hungary, Bulgaria, and Greece, Italy hoped to put Jugoslavia into an isolated position, and force her to abandon her friendship on France in order to keep peace with Italy.

ASIA AND FAR EAST

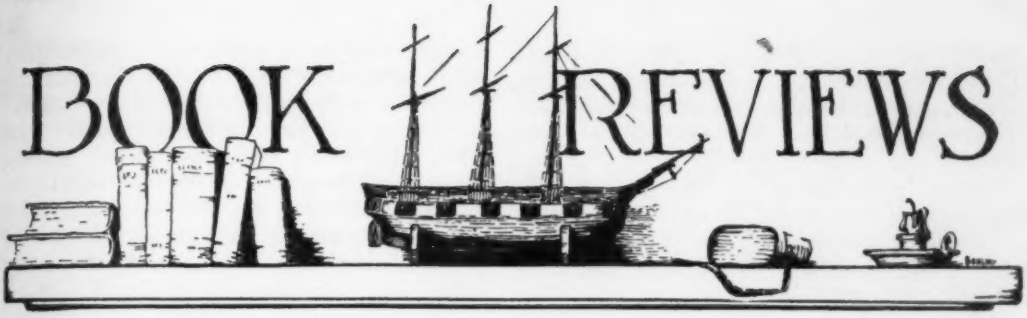
AFGHANISTAN'S THREE KINGS.—As an outcome of the rebellion in Afghanistan which finally made it impossible for King Amanullah to hold Kabul, he abdicated on January 14 in favor of his elder brother, Inayatullah, and escaped to India. Three days later Inayatullah followed his brother's example, flying away by airplane and leaving the capital in the hands of the rebel leader, Bacha Sakao. Bacha proclaimed himself emperor and set about organizing a government. Meanwhile Amanullah, whose abdication was apparently only a temporary expedient, reappeared at Kandahar, the second Afghan city in size, and undertook plans for renewed opposition to the dictator at Kabul, with good prospects of success in view of the swing of popular sentiment in his favor.

Through his mother's influence, Amanullah gained the throne in 1917 after his father's assassination, and following hostilities in 1919-20 with England, he secured a treaty ending the British protectorate. Since then the king has received, instead of the former British subsidy of £120,000, an annual payment of a million gold rubles ($515,000), from the Soviet Republic. Hence the persistent, though apparently unfounded rumors that British influence is behind the present troubles. The rebellion, attributed to Amanullah's efforts to introduce western customs, followed closely upon his tour of the western nations last summer, during which the king established very friendly relations with the Soviet Government and also with Turkey.

SINO-JAPANESE PARLEYS FRUITLESS.—Toward the close of January, negotiations between the Japanese and Chinese Nationalist Governments were renewed at Nanking, but were again dropped on January 28, without decisive results. No promises were drawn from Japan as to the removal of her military forces in Shantung, and the Chinese made this a condition to the settlement of other problems.

Following the agreements made by the United States and Great Britain, Japan was forced at the close of the month to signify her acceptance of the new tariff, effective February 1.

MANCHURIAN LEADER EXECUTED.—The arrest and summary execution on January 11 of Yang Yu-tung, former chief of staff of Chang Tso-lin and long a controlling factor in Manchurian politics, marked the end of one of the two leaders principally instrumental in helping Chang Hsueh-liang to succeed his father, Chang Tso-lin, as dictator. While there were rumors of misappropriation of funds and treasonable plots, the execution was generally connected with Yang's opposition to Chang Hsueh-liang's rapprochement with the Nationalists. Another general who was in consultation with Yang at the time of his arrest was shot along with him.



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INTIMATE PAPERS OF COLONEL HOUSE. Arranged as a narrative by Charles Seymour. New York. Houghton, Mifflin Company. Vols. 3-4. 1928. $10.

REVIEWED BY CAPTAIN W. R. GHERARDI, U. S. NAVY

The two concluding volumes of *The Intimate Papers of Colonel House* have now been published and form a most important addition to the history of the World War period.

President Wilson selected Colonel House as chief of the organization for preparing the American case at the peace conference, appointed him head of the American war mission to Europe for the coördination of military and industrial effort, and asked him to draft a constitution for a league of nations. He sent him to Europe as American representative on the Supreme War Council when it arranged the armistice with Germany. He shared President Wilson's labors and held his complete confidence during the period which led up to and immediately followed the war.

Those who know Colonel House personally also know his honesty of purpose and his close adherence to the facts as he saw them. In this book there is no desire to evade the many issues which came to his knowledge nor to gloss over any part which he may have had in the negotiations which took place under his observation. The book reflects a singularly candid and reflective mind which has passed through an experience which no other man except the President himself shared.

To President Wilson he was loyalty itself. He shared with the President the ardent desire for a league of nations of such a form as to make future wars impossible. He believed such a league possible. He believed that the accomplishment of such a league could be had only by the adoption of the principle of the "Freedom of the Seas."

When conditions arose which rendered it necessary to put aside the ideal in order to hold to what had been accomplished by the armistice he did so, but his feeling never changed.

The debt which the world owes to Colonel House for his work during that time of its travail will be increasingly recognized as the years progress. In his private capacity as the closest friend and adviser of President Wilson he exercised an influence on the war, on the armistice, and on the peace conference perhaps greater than any other person, private or public.

It is not too much to say that President Wilson turned to Colonel House for advice on every matter wherein American relations with the Allies came into question.

As a result of his intercourse with European statesmen, with many of whom he established close personal relations, Colonel House was in a position to conduct for the President negotiations of a most vital character. The letters and papers covering this entire period were carefully preserved and form the basis for these two volumes.

The book is not a history of the war and is not intended to be so. It is written to show the nature of Colonel House's participation in the important acts in which America was associated with the Allied

Powers in 1917, 1918, and part of 1919. Professor Seymour, who has ably edited the book, says: "It leaves to the future historian to determine where he and others were wrong."

Nevertheless, these volumes have an interest to all who would follow the sequence of events connected with American participation in the World War, from the time of her entry until the signing of the peace treaty. To the naval officer it has a distinct appeal, for the application of naval power is often shown as being determinative in its effect.

How narrowly the European Allies escaped a complete break with the United States during the armistice negotiations is told for the first time in authoritative form.

In Colonel House's diary in November, 1918, is found the following:

> It is difficult to fully tell of the tense feeling that has prevailed due to the discussion of the Fourteen Points. George and I, and Reading and I have had many conferences, separately and together..... Lloyd George said that Great Britain would spend her last guinea to keep a Navy superior to that of the United States or any other power, and that no cabinet official could continue in the government in England who took a different position. I countered this by telling him it was not our purpose to go into a naval building rivalry with Great Britain, but it was our purpose to have our rights at sea adequately safeguarded, and that we did not intend to have our commerce regulated by Great Britain whenever she was at war.

That the negotiations between President Wilson, Lloyd George, Clemenceau, and Orlando leading to the adoption of the Covenant of the League of Nations and the Treaty of Versailles were often in danger of breakdown is shown in these volumes.

The reason for the estrangement which took place between Colonel House and President Wilson will never be known. It is referred to in the concluding sentence of the book as follows:

> My separation from Woodrow Wilson was, and is to me, a tragic mystery, a mystery that can now never be dispelled, for its explanation lies buried with him.

MY MYSTERY SHIPS. By Rear Admiral Gordon Campbell, R.N., London: Hodder and Stoughton, 1928. New York: Doubleday, Doran and Company, 1929.

REVIEWED BY BROCKHOLST LIVINGSTON

To know Admiral Campbell is to recognize that his splendid work with the mystery ships during the late war was part and parcel of his desire to serve. He craved no distinction save that gained by sheer valor. He desired no flaming press reports. His book, for which we have waited a long while, is characteristic of the man who wrote it. It is a tale told in a simple yet enlightening fashion and brings us an account of deeds which went unsung while they were being done. As commander of a "Q" ship, Admiral Campbell won the highest decoration of the British nation. A Victoria Cross and three distinguished service orders are proof of the fine accomplishments of this officer.

Throughout the book one point stands predominant. The author claims no special credit for himself. He is continually anxious that we shall not make the mistake of considering him solely responsible for the results obtained. To his crew he makes repeated acknowledgements of aid, concluding: "A finer crew no man has ever had the honor to command . . ."

As Admiral Sir Lewis Bayley has written in a foreword, it is "a book which will enlighten its readers as to the heroism, wonderful patience, and self-control shown by all who served in these mystery ships."

The mystery ship played a more important part in the antisubmarine campaign than most of us are aware. Admiral Campbell, while dealing principally with his own ships, also touches on many points of general information concerning the choice of and fitting out of the vessels to be used, and the tactics employed by the ships when attempting to decoy submarines. However, the book is nontechnical and is very light reading—the type you read for pleasure rather than through compulsion.

In a summary the author has discussed the comparative value of the mystery ship and other classes of antisubmarine vessels. "It may appear to the reader . . ." he writes, "that an enormous amount of effort was used (by Campbell's ships) to destroy three submarines—in fact, in obtaining these three destructions, one merchant ship was beached, one put into drydock, and one sunk. It is only by comparison that a more correct estimate can be made." Over 180 mystery ships were fitted out and the number of submarines to their credit was eleven. Against this we place, for the destruction of 145 submarines (total destroyed due to

our own action) "some 5,000 auxiliary craft employed, thousands of mines, guns, depth charges and bombs, miles of nets, vast convoy systems, and many other contrivances and contraptions." From this, he believes, "it may be realized that to encircle and destroy a submarine is not such an easy thing as may appear to the arm-chair critic." Seven per cent of the known submarine destructions are credited to mystery ships. The effect on morale while not possible to estimate, must have been great.

Carrying his discourse into the realm of "might-have-beens," he ventures that "supposing (in 1915), instead of two or three mystery ships operating, there had been about thirty, as there were in 1917. It is not too much to suggest that the whole submarine menace might have been avoided." From the standpoint of the breaking down of morale this seems a quite probable accomplishment.

In stating that the question whether mystery ships will be used again cannot be answered, Admiral Campbell wisely says: ". . . . but one thing is quite certain . . . . in any war some form of deception or decoy will be used by sea, air, and land, and if anyone has ideas for such in future wars, he will be wise to keep his mystery to himself until it can be used with the maximum chance of success."

With each new volume that appears, the history of the World War becomes more complete. Individuals have contributed their personal accounts. Classes of ships have been dealt with by various authors. Battles have been discussed. Certainly no war was ever more thoroughly "covered." Admiral Campbell's account is somewhat novel in that it treats of a subject of which we knew so little while it was taking place. It should be popular with both the naval and civilian reader.

THE LIFE OR SIR MARTIN FROBISHER. By William McFee. New York: Harper and Brothers. 1928. $4.00.

REVIEWED BY BROCKHOLST LIVINGSTON

William McFee has written a biography of Frobisher, seaman, pirate, explorer, and admiral in the service of the great Queen Bess. After reading his book one wonders why there is such great ado about the subject. The author states:

> For Drake and Raleigh and Leicester, Elizabeth revealed great affection and even passionate admiration. She could express a valiant faith in their high loyalty and desperate courage. But when it was a matter of simple duty, a matter of humdrum, hammer-and-tongs naval vigilance and strategy without either spectacular privateering or action lurid with glory, she sent for Frobisher.

Granting this, we, nevertheless, marvel that Britain has found so much to admire in the characters of her Elizabethan seamen.

We are cautioned by the author that "there is nothing to be gained by injecting modern ethics into the discussion of a sixteenth-century corsair," and yet, as we read the lives of those corsairs—legalized pirates—we are thankful that American naval history is made up of characters and events so much more wholesome and legitimately colorful than Britain's.

The book carries with it something of the flavor of the sea that is about McFee, and brings vividly to us the happenings of that period in Britain's history when, by the destruction of the Great Armada, she reduced her rival, Spain, to a position of inferiority.

Apparently Congress is not the only body to question expenditures for a navy. Elizabeth, with the Spanish Armada even then approaching, was backward about providing the bare necessities of food and water for the British ships. "The Invincible Armada was defeated," says McFee, "not by strategists in Whitehall, not by military aristocrats, nor yet by the leadership of the sovereign, but by the mariners of England." And, we add, only so shall all future enemies who come by sea to any land!

McFee prefaces his book with: "The intention in this book has been, so far as human frailty permitted, to avoid controversy and partisanship." He has done well by this resolution and if we find the substance disappointing we should rather lay the blame to the character of the subject than to the skill of the author.

JOHN CAMERON'S ODYSSEY. Transcribed by Andrew Farrel. New York: Macmillan Co., 1928. $4.50.

REVIEWED BY PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

A hard-hitting, hard-drinking, hard-headed mate and master of trading vessels, principally in the Pacific, from 1865 to 1895, a Scot with a Scot's virtues and vices, and

a knack, also Scottish, for pushing a pen—such was Jack Cameron, whose adventures this *Odyssey* tells. Its publication no doubt stimulated by the immense popularity of *Trader Horn*, the book has many of *Trader Horn's* attractive qualities, but without the romantic fictional element, which for some may increase its appeal. Here is the man's character laid bare, something of his sailor-made philosophy of life, and much of what he lived through. Cameron wrote the original manuscript; the transcriber, it appears, has done little more than touch up Cameron's grammar and pare down his story. He has certainly not falsified it, for his copious notes at the back show a keen appetite for facts. Altogether it is a readable and valuable book, a vivid and realistic, not romantic, picture of "lights and shadows of the South Seas."

For about ten years Cameron was before the mast, chiefly in British windjammers, and it seems a sad commentary on old-time discipline that he had a fistic combat with mate or master on pretty nearly every ship in which he sailed. Risen to officer's rank, he drifted from San Francisco westward to Honolulu and the South Seas. This is the bulk and best of the story—a "blackbirding" cruise for native laborers in the New Hebrides; an extraordinary voyage as mate of *The Wandering Minstrel*, ending in her shipwreck on Midway Island (which furnished material for Stevenson's *The Wrecker*) and the escape of Cameron, a Danish semi-lunatic, and a China boy (selected, so Cameron says, because he was plump and tender, in view of possibilities) in an open boat fifteen hundred miles to the Marshalls; then trading, smuggling, and carousing again among the islands. After thirty years of it, Jack married a chief's daughter, took a year's pleasure jaunt in his own vessel, and thus ended his story. But for another thirty years, till his death in 1925, he was settled in Japan, a trusted employee of Standard Oil. It was here, in 1921, that he went to hear the singing at the reunion in Japan of the Annapolis Class of '81. "These old American naval officers," he said, "must know how to sing chanteys." But he was disappointed; the setting at least was wrong.

In old age Cameron mellowed. "In my mind's eye," says the transcriber, "I can still see the old fellow, boyish hearted at seventy-four, stocky, deep-chested, broad, powerful, with a white thatch and white mustache and beard, a sparkle in his gray eye—I can still see him rolling over the skyline to suggest that, in view of the phase of the moon or the physiography of Mars, it was time to splice the main brace." Not perhaps a literary *chef d' oeuvre*, his book is a good one for man or boy. It has nothing too strong for boys nowadays, and in another way it may do them good.

SIX ANS DE CROISIERES EN SOUS-MARIN. By Lieutenant Johannes Spiess. Translated from the German by Lieutenant Henry Schricke. Published by Payot, Paris. 18 Francs.

REVIEWED BY MAURICE PRENDERGAST

"Thou shalt go thou shalt return never in battle shalt thou perish!"

—Reply of The Delphic Oracle

What did the World War look like, from the other side, and especially from the viewpoint of the German submarine commanders? That is a question which we have often asked ourselves. The further the conflict progressed, the more did the Allied navies devote themselves to deadlier campaigns for the extermination of the U-boats. Upon the officers and men of these German craft fell the fury of a merciless and relentless warfare, devised for their utter extinction. They became the Ishmaels of the seas, with every man's hand against them. What were the personal experiences of the German submarine commanders? What, for example, did it feel like, to be attacked by depth charges? To be trapped by decoy ships? To be tracked by hydrophones, and to be hunted into barrages of nets and mines? Surely, these men had war experiences worth the narrating.

Lieutenant Johannes Spiess, of the German Navy, has at last satisfied our curiosity by giving us his reminiscences. Few men alive today are better qualified than he to describe from personal experience the development and downfall of the German submarine service. On October 1, 1912, Lieutenant Spiess joined the *U-9*, to serve as second in command to Lieutenant Otto Weddigen, the first, and perhaps the most famous, of all the "U-boat aces." On the evening of November 11, 1918, Lieutenant Spiess hauled down the colours of *U-135*

for the last time. Between those two dates, he served, without a break, for six years, a month and twenty days in the submarine branch of his service. It is doubtful if there is alive today any other German officer who can present a similar record of duties during the World War. Of the many fellow officers who served with him in the submarines, Lieutenant Spiess says that hundreds were killed in active service or were made prisoners of war; others lost health and sanity itself under the strain of their experiences. And when one reaches the end of this book, one marvels that the author should ever have survived to write it. Few more exciting narratives of participation in the War of 1914-18 have ever been written. A certain German philosopher has declared that the secret of happiness lies in living dangerously. If this be a true criterion, Lieutenant Spiess must have been the Happy Warrior of the World War. But from the general tenor of his remarks, we gather that he found Nietzche's advice of little consolation, when on the wrong side of a depth charge!

Let us first take a glance at the author's record, as detailed in his book. From October, 1912, to January, 1915, he served under Weddigen in *U-9*. Thus it came about that he was present at one of the most memorable and startling events of the naval war—the sinking of the three big British cruisers, *Aboukir*, *Cressy*, and *Hogue*, in rapid succession, by *U-9* on the morning of September 22, 1914. One cannot, of course, describe Spiess as an "eye witness" of this event, for Weddigen was at the periscope. However, his station was behind Weddigen and he gives a graphic and most interesting account of the approach, the attack, and the handling of the boat. During the next cruise, the British cruiser *Hawke* was sent to the bottom. Then the two men parted. Weddigen went to take over the command of *U-29*, a boat with none too promising a reputation, for she had returned unexpectedly from her first cruise with her commanding officer nearly insane. Weddigen took her out, to meet death under the ram of H.M.S. *Dreadnought*. Spiess succeeded to the command of *U-9* in January, 1915. The anti-shipping war "with restrictions" having begun, Spiess took his boat out to the Dogger Bank, and there sank about a dozen British trawlers and two or three small steamers. Three months later, Spiess was detailed for service in the Baltic against the Russians, and remained there until *U-9* was deemed obsolete, and relegated to training duty in April, 1916. He went back to the Baltic in August of the same year, in command of *U-19*, and operated in that area for the next four months. After the outbreak of the 1917 anti-shipping war "without restrictions," he was sent out with *U-19* to observe the organization and tactics of the first British mercantile convoys, and to raid them. His first attempts were against the Scandinavian convoys running between the Shetlands and Norway. Made proficient by this experience, he was put to the work of harassing the big Atlantic convoys. In October, 1917, he was promoted to the command of *U-52*, but all his luck left him when he took over his new boat. She met disaster but through no fault of her commanding officer. So he went back to his old love, the *U-19*, and did not leave her till April, 1918; by that time she was the oldest submarine of the German Navy still on active service, and was practically worn out. During the last six months of hostilities, he commanded the big and fast *U-135*, but saw no active service in her.

What new historical material can we glean from *Six Years of Cruising in Submarines?* In his preface, Lieutenant Spiess disclaims all intention of writing history in the grand manner of circumstance and chronology. His purpose was merely to put forward his personal adventures, and to show how, as the war progressed, new problems arose, and had to be met and mastered by the commander of a submarine.

Despite this disavowal, he furnishes us with new information materially affecting our appreciation of historical events. In the first place, he does us the notable service of fixing our starting point; he shows us the exact condition, both in material and personnel, of the German submarine service before the war. There is a Latin saying that "things mysterious are assumed to be magnificent," and the maxim applies in this instance. Such secrecy surrounded the *U*-boats up to 1914, that the idea became current—and still prevails to some extent—that the German fleet embarked on hostilities with an underwater arm far more efficient than that possessed by any other navy.

Lieutenant Spiess, in his first chapter, dis-

pells all the glamour of mystery, and shows us things as they actually were. And what a condition things were in! It is almost impossible to believe that this same service, in the space of four years, was to provide the crisis of the naval war. When Spiess joined in 1912, the *U*-boats were crude, clumsy, and inefficient; the main job was to get them to dive and keep underwater at all, let alone fire torpedoes. Fires, explosions, and accidents were not infrequent. Consecutive training was out of the question, for the submarines had to be continually hurried back to the yards, to have defects remedied, to be tinkered with, and improved. The strongest seamen, stripped to the waist, could only stand a ten-minute spell at the diving-rudder controls. Training, when it was actually carried out, was marked by caution verging on timidity. To go deeper than forty-five feet was considered to be simply suicidal. Living conditions were so squalid and uncomfortable that a week at sea in a submarine was deemed to be beyond the powers of human endurance. One of the glories of *U-9*, by the way, was a patent electric cooker, that promptly short-circuited as soon as a frying pan was put on it! Outside of the hulk *Acheron* (parent vessel of submarines at Kiel), few German officers believed that the diving boats could, or ever would, do anything in actual warfare.

It was Weddigen who first confounded the croakers. During the May exercises of 1913, he hit, with four successive torpedo shots, the battleships *Friedrich der Grosse, Ostfriesland* and *Thüringen,* theoretically placing these three dreadnaughts "out of action." It was so sensational a performance that a little more initiative was allowed in the training system thereafter. None the less, it was only just before the actual outbreak of hostilities that Weddigen was allowed to demonstrate that he could reload his tubes while running submerged. People said such a thing simply could not be done, and when Weddigen showed that it could be done, they asked, what was the good of such a stunt? Within two months, Weddigen had crushingly proved "the good of it." By rapidly reloading his tubes, he was able to sink the three British cruisers *Aboukir, Cressy,* and *Hogue* in little more than one hour. In that disaster, the British Navy lost nearly 1,600 officers and men. The "stunt" proved stunning to Germans and British alike.

It is not likely, so long as the present Bolshevist *régime* prevails, that the Russians will ever issue any official history of their part in the naval war of 1914-17. If such an account is ever prepared, it will have to be, perforce, compiled from a variety of sources and authors. To such a patchwork compilation, Spiess's book will furnish some useful facts. We learn, for instance, that from the very first days of war, the Russians had mines of remarkable and deadly efficiency; they mined the Baltic on a grand scale, and were past masters in planning and planting their fields. The two great barrages of mines and nets across the Finnish Gulf were recognized from the very outset as being impassable for the German submarines. In other words, the Russians had at the start what the Allied navies did not get, even at the very end of the World War.

On the other hand, Lieutenant Spiess makes a laughing stock of all that silly mystery-making in which the Russian ministry of marine loved to indulge itself. To cite an instance: the charts issued by the Russian hydrographic service never disclosed the existence of certain safe channels amongst the reefs of the Aaland Islands. These "secret" passages the Russians wished to preserve for their own exclusive use, in the event of war. But, for information regarding soundings and lights, the Russians went to Finnish pilots. No sooner had war begun, than the Germans got in touch with the same Finnish pilots. It was not long before the Germans had ascertained all that was worth knowing, from a navigational point of view. In the autumn of 1914, the Russians established a "very secret, advanced base" at the island of Uto, "the Heligoland of the Finnish Gulf," reckoning that the Germans would never be able to discover the approach channels amongst the reefs. The Germans responded by sending the battle cruiser *Von der Tann,* and other cruisers, to Uto. The "highly secret" base received a "most confidential" bombardment before the Russians had time to settle down there!

Such chaos and confusion reigned in the German naval ports during the last days of the World War that we have, even now, no very clear perception of what actually took

place. Spiess tells us how he witnessed the last throes of the Kaiser's Navy. He even gives us a glimpse of Hipper, the commander in chief of the High Sea Fleet, at that dreadful moment when mutiny broke out in the battleships. The fleet was assembling for the last grand sortie against the British coast, when Spiess was suddenly summoned before Michelsen, commodore of submarines, Wilhelmshaven. "Are you sure of your crew?" asked Michelsen. Puzzled as he was by such an abrupt question, Spiess replied in the affirmative. Then the commodore broke the news. The battleships *Ostfriesland* and *Thüringen,* lying out in Schillig Roads, had mutinied. Spiess was to take the *U-135* out there, and act "upon orders from the Fleet Command." The meaning of these instructions could be easily divined: the big submarine was to attack and sink the two rebel battleships, should the necessity arise. Lieutenant Spiess went to Admiral von Trotha and asked for written orders, but the chief of staff refused to put anything into writing. *Litera scripta manet*—and perhaps the mutineers might win in the end! In that event, a written order might prove highly inconvenient to its author!

Spiess therefore appealed to Cæsar, and requested an interview with the commander in chief. All he got for his pains were a few brief words from Admiral Hipper, no clear orders, a bow—and the interview was over.

Why did Hipper, the indomitable leader of the battle cruisers at the Dogger Bank and Jutland, act in so undecided a way, when he saw insurrection breaking out within his command? It is hard to answer such a question, but in Lieutenant Spiess's narrative, we get glimpses of a sinister figure standing in the shadows behind Hipper —the figure of Admiral Kraft. Kraft, the incompetent, had once got "The Blue Letter"—that is to say, he was compulsorily retired, and virtually dismissed the service. From "The Blue Letter" there was supposed to be no appeal; it was St. Helena. But to Kraft, it was simply an Elba; he "came back" and was installed at Berlin as controller of the dockyards. Incompetent as ever, he did nothing to back up the war front with adequate supplies. Clamor from the fighting line drove him from office, and he was kicked upstairs into the command of the High Sea Fleet's best battle squadron. When the mutiny of October 31 had collapsed before the threat of *U-135,* certain naval leaders advocated drastic measures, to purge the fleet of mutineers, and restore discipline. Kraft would have none of these remedies; he decided to take his battle squadron to Kiel, "where the men would come to a saner state of mind." It was just the very move that precipitated the final crash, for, once arrived at Kiel, Kraft's seamen broke away from all restraint and began the revolution.

When all recovery of discipline in the High Sea Fleet became hopeless, Michelsen left Wilhelmshaven in *U-135,* and with a force of some fifty submarines, torpedo craft, and patrol vessels assembled at Heligoland, he tried to organize a "last-ditch" navy. But the island-fortress went "red," and the "Forlorn Hope Fleet" tried to find a new base in Lister Deep, behind Sylt. On arrival, internecine strife was found to be raging in Sylt, and no pro-Hohenzollern ships could stay there in safety. There was nothing for it but to take the ships back to the naval ports, and surrender them to the "Soldiers' Councils." Michelsen hoisted his broad pennant in the cruiser *Graudenz,* and passed down the line, to take the salute of the submarines for the last time.

Here is a remarkable side light from Spiess regarding the genesis of the German submarine war on shipping. When H.M.S. *Hawke* was torpedoed by Weddigen, October 15, 1914, the British consorts of the stricken ship at once steamed away, in accordance with their standing orders. Against the retreating cruisers *U-17* made an attack, but met with no success. So she went over to the Norwegian coast, and having nothing else better to do, captured and scuttled the steamship *Glitra,* the first mercantile ship ever sunk by a submarine. When *U-17* got back to Heligoland and reported, Spiess tells us that the captain in command of submarines there was simply dumbfounded. He simply dared not breathe for several days, until the commander in chief had accepted *U-17's* escapade as a *fait accompli* and approved it. That gave Germany the idea of blockade by submarines. No one tried to foresee how far such a form of warfare would go, or where it would lead Germany in the end. Never was there a better illustration of Cromwell's

saying: "No one goes further than the man who does not know where he is going."

Insignificant in itself, but interesting from an historical point, is the following entry made by Spiess, just before he left the Ems on May 7, 1917:

> Before sailing, I had a conference with the captain of our Flotilla, and I was made acquainted with a report on the last cruise of the *U-49*, which had come into the place. Her Commanding Officer remarked, amongst other things, that some ship had thrown "a marine-bomb" at him. At this period, it was a novelty that created a sensation.

The "marine-bomb" was, of course, the depth charge, and so we know now when the Germans were first introduced to the "ash can." Spiess became quite familiar with it later on—so familiar, in fact, that he calls it in his book nothing more or less than "an accursed invention." But a sense of humor never was a strong trait amongst the Germans!

The sinking of shipping naturally runs through the whole narrative. Spiess did not embark seriously on this branch of his duties until convoys were first coming into use. Blame has often been imputed to the British Admiralty for holding to the view for so long that the convoy system was not practical. Let this be remarked: Spiess frankly confesses that the Germans themselves thought modern steamers never could be worked in assembled masses across the high seas. Once the system was taken up by the British, Spiess was sent out with *U-19* to watch, report on, and attack the Scandinavian convoys. It was not long before he discovered that the route then lay between Lerwick in the Shetlands, and Aspo Fjiord, Norway. He soon adapted himself to conditions as he found them. If he sighted, say, a convoy off the Shetlands in the evening, he used to set off, and steer a course parallel to the convoy track all night, so as to be in an intercepting and attacking position at dawn. If he sighted the convoy at dusk off the Norwegian coast, he reversed his procedure. So well did he estimate the situation that if he met and missed an outward convoy, he knew exactly where and when he would get a contact later, with an inward convoy. The Scandinavian convoys ran daily in each direction; they were mostly composed of small steamers, usually not more than twelve in number. They emitted such clouds of smoke that they were "like traveling volcanoes," and easy to sight, in clear weather, at long range.

The first time Spiess saw a big convoy moving out into the Atlantic, he was amazed. The number of ships, and their individual sizes, exceeded anything he had seen between the Shetlands and Norway. What surprised him most was that the Atlantic convoys emitted barely a vestige of smoke; the ships kept station, and altered course upon a given signal, like a fleet of warships. Time and again was he frustrated in attacking convoys, but once or twice he had the good luck to emerge in the middle of the mercantile fleet, to play "the devil amongst tailors." He notes with pride those days when he "gets a double," that is, making hits, almost simultaneously, with two torpedoes, fired first from a bow and next from a stern tube—a performance he acquired from Otto Weddigen. He gives an idea of the various kinds of convoy formations, and the methods of approach and attack he employed under diverse conditions.

One observes a rather peculiar point in these records, and it is too important a one to pass over without comment. This is the difficulty of accurately identifying ships, and estimating their size by periscope. When Weddigen first examined the three British cruisers of the *Cressy* class through *U-9's* periscope, he declared they were British light cruisers of the *Birmingham* class. Later, he altered his opinion, and, when making his way back to his base, he got off a radio message, believing he had sunk "three British cruisers of the *Kent* class." In both opinions, he was wrong. When he sank the *Hawke*, he thought he had only put down an old, two-funneled gunboat. Spiess confesses that he missed mercantile targets many times, by overestimating size and draught. A 2,000-ton steamer, light and in ballast, he often mistook for a ship of 5,000 or 6,000 tons, with the result that his torpedo went off with too big a depth-setting, and underran the target.

Antisubmarine warfare plays a large part in his memoirs, and, at times, assumes nightmare proportions. He had only two encounters with the famous "*Q*-Boats" or submarine decoy vessels. The first, a three masted sailing ship, he was able to detect by a small defect in her disguise, and he kept clear of her. Wary as he was, he got trapped by "an old flower-pot" of a dis-

guised brig later on, but escaped from her clutches with nothing worse than a bad scare. (You can always tell when he is rattled, because after the alarm is over, he starts swearing that he will wage bloody warfare on everything, north, south, east, and west!) Destroyers he dreaded from his very first experience of them, in October, 1914, when, standing by Weddigen's side in the conning tower of *U-9*, he heard H.M.S. *Nymphe* pass, "like a clap of thunder" over his head. Even the imperturbable Otto mopped his brow, it was so close a thing! Spiess relates one peculiar "let-off" by an American destroyer. He was taking *U-19* home, as the boat had been damaged in the after tubes by a depth charge, and trouble with the engines was developing. On September 13, 1917, fog was about, and a heavy sea running. In the afternoon, he suddenly sighted a United States destroyer, a little more than 1,000 yards away. The American boat had such trouble in going about in the heavy sea that Spiess had time to efface himself and *U-19*, damaged though as she was. He publicly thanks his lucky star, in his book, that this destroyer did not have her guns manned and ready for action.

Four times was he caught, at point-blank range, by Allied submarines, and every time escaped. One evening in 1915, he ran submerged through reefs and mine fields, under the very muzzles of coast defense batteries, past signaling and watch stations ashore. right into the "secret" Russian base at Uto. There, in a narrow channel, he met a Russian submarine, coming right down on top of him. He made a desperate effort to swing his boat around under water, and spiked her on a rock. The Russian saw him and opened fire with gun and torpedoes. The ensuing fight, in the twilight, between the two submarines was brief; it ended by the Russian boat incontinently bolting off, and Spiess was left to grope his way out again in pitch darkness.

On another evening he was coming down the North Sea, homeward bound, and sighted smoke on the horizon to the west. After studying it for some time, he came to the conclusion that it was a British warship, too far off and moving much too fast for him to make an attack. He ordered watch to be kept on it, and went below to turn in. Just as he was settling down in his bunk, he overheard the remark of a seaman in one of the forward compartments, to a shipmate, " . . . . smoke no longer in sight." Instinct, more than anything else, made the German lieutenant turn out and go on deck. He asked the man on watch if the smoke was still in sight. "No," replied the man, staring through his binoculars, "it is not—neither is the conning tower of a submarine." This latter remark alarmed Spiess, and at once he put the *U-19* hard about. Then there heaved up from the depths a great British submarine, but a few yards away! The sudden change of course had thrown the German boat across the bows of the British craft; the latter, to avoid a head-on collision, had stopped her engines, and at once bobbed up to the superior and aërial world. The amusing thing was, neither side could do a thing in the way of injury, to the other. Had the British boat fired a torpedo, she would have immolated herself, besides extinguishing her antagonist. The German boat had her gun neither manned nor loaded. So, after glaring impotently at each other, the two combatants saved what little was left of their dignity, by diving alongside of one another!

What was this German lieutenant's most fortunate escape? He bore so charmed a life, it is hard to select any specific instance, but the following episode is, perhaps, without parallel. In Chapter X, "A Fruitful Cruise, and Adventures around England," he narrates how he sighted, near the Scilly Islands, the Norwegian bark *Akaora* running fast before the wind. Being on his guard against sailing decoy ships, he decided to attack submerged, but, misjudging his distances, he had to make a second attempt to get into a firing position. To quote his own words:

> *U-19* went about to starboard. To recover my firing line, I went up to attacking depth, with a bow tube ready. After the estimated time had elapsed, I should have found myself in a very good position for my shot. Up periscope more; the periscope is not high enough yet! . . . . Ah! that's the surface . . . . but it's swamped again by a wave! . . . . At last! now I can get a sight. . . . . Oh! a grey wall rises up before me in the eye-piece. . . . . Horrors! we are rammed! . . . . Every hand forward! Dive! Down with her! Stop both engines! Bow tube, hold fire!

Then the submarine crashed, bows on, into the side of the sailing ship, and under the

shock of the collision, the bow tube fired itself!

After Spiess had surfaced, chased, overhauled, and sunk the *Akaora*, he examined the bows of his boat, and tried to puzzle out what in the world had happened. By all rights, both submarine and sailing ship should have been blown to pieces instantly. From marks upon the slightly twisted stem, it became evident that at the moment of ramming, the *U-19* had assumed a negative angle, with her bows pointing downwards. So the torpedo had shot just under the keel of the Norwegian bark, and had passed on, heading for the bottom of the Atlantic. A few more inches and . . . .!

Of quite a different category was his escape from *U-52*. With this boat, he had no luck whatever. Barely had he begun his first cruise in her when she fractured the head of a Diesel engine cylinder, and he had to put back to Kiel for repairs. The boat's performance had been so unsatisfactory that Spiess asked for a general overhaul. He went ashore with the chief engineer and some hands to make arrangements about repairs to the damaged engine. There was a terrific report just behind him. Splintered glass flew in all directions from the windows of the dockyard buildings. Turning round, he saw a great column of smoke rising from the basin over the place where *U-52* should have been. Running back, he was just in time to see the conning tower disappear under water. The account of the salvage operations, and the rescue of eight men, imprisoned within the sunken boat, is most interesting, but cannot be commented on here.

What was the cause of the disaster? The whole thing was an utter mystery for days afterwards, and then, chiefly by chance, the clues were found. They consisted of a severed hand, discovered still grasping the control wheel of a valve, and a minute fragment of a shattered torpedo. The origin of the explosion was this: the after tubes of the *U-52* had been designed to take torpedoes six meters long, but into them had been loaded Mark G.VII torpedoes, nominally seven meters long. This could be done by leaving off the long net-cutter usually affixed to the noses of German torpedoes. It was an extremely dangerous expedient, for it left the firing gear in the nose of the G. VII torpedo dangerously close to the inner face of the tube port. Once loaded into the six-meter tube, the seven-meter G.VII torpedo could only be withdrawn by being disassembled in three sections—a long, intricate and dangerous job. Spiess never intended that the after tubes should be touched, and gave orders to that effect before he went ashore. The small, twisted fragment showed that the G.VII torpedoes had never been secure in their tubes. The dead hand proved that some one had opened a valve, delivering compressed air at high pressure into an after tube. Under the air blast, the torpedo had moved forward, the firing gear in its nose had violently struck the inner face of the closed tube port—and instant disaster ensued. The Germans thereafter pondered, whether the advice about not putting new wine into old bottles, might not also apply to torpedoes and their tubes!

Terrible is the account given of the events that marked the evening of April 15, 1918, in the Northern Channel. Here, on his preceding cruise, Spiess had achieved what he considers to be his finest attack during the whole war. He had torpedoed and sunk H.M.S. *Calgarian*, one of the biggest armed merchant cruisers of the British Tenth Cruiser Squadron. One cannot deny, after reading the version presented by Lieutenant Spiess, that it was a remarkably fine piece of submarine handling. The big armed liner was moving fast, and was escorted by two destroyers, but Spiess got his first torpedo home, at a range of only 200 yards. Seeing the *Calgarian* stopped, but still afloat, he went back to finish her off, although he had been heavily depth-charged and knew he would be so attacked again. Around the stricken ship and in the vicinity, Spiess counted seven destroyers, eleven armed trawlers, and three sloops. He wondered where this mob had meandered in from, and found that a big convoy was passing by, and sent part of its escort to protect the torpedoed auxiliary cruiser. Against these odds, back he went; a trawler charged onto him and began to pelt him with depth charges from just overhead. With a final effort, Spiess fired a double shot from two bow tubes, and down went the *Calgarian* for ever.

But he was imprudent enough to go back to this area, on his very next cruise. Admiral W. S. Sims, U.S.N., has told us, in

his book on the World War, that the British Admiralty knew exactly where the *U*-boats went, what they sank, when they left, and returned to their bases. After the loss of the *Calgarian*, the lords commissioners of the Admiralty, no doubt, strongly desired that the head of Lieutenant Johannes Spiess might be presented to them in a slop-bucket, and perhaps gave orders to that effect. There is every evidence that when the *U-19* again appeared in the Northern Channel, she walked straight into a murderous trap. Nothing happened at first; nothing at all! Spiess thought it a little odd, that on three successive days he should sight three British sloops, wandering about in a seemingly aimless manner, always just outside of his reach. At 7:30 P.M. on April 15, 1918, he sighted a big convoy, five miles away, and coming up towards him. He dived, and got ready to attack, when, into the periscope's field of vision there drifted one of those sloops. She was only 1,000 yards away, and hove to.

She was far too rich a thing to miss, for she presented such a simple, sitting target for a shot. He would collect the sloop first, and then get on with the convoy attack. He was just drawing a bead on the sloop, when —a depth charge explosion, close above, nearly lifted him from the central control station into the conning tower overhead. Then, rocking and reeling under the depth charge concussions, *U-19* plunged madly down to the sea bed, crashed on it, and stopped. They dared not move for fear the sloop would locate them on her hydrophones, and give them another dose of the "water-bombs." All electric lights were shattered and extinguished; seams were started and water creeping in; the batteries were nearly exhausted. However, night was not far off, and in the darkness they might be able to slip away. Spiess meditated long and deeply on two unpleasant discoveries he had just made. Firstly, he had gone dead slow on his engines, to beat the hydrophones, but the sloop had heard the noise of the motor raising the periscope, and had fixed his position by that. Secondly, the British sloop had mortars or howitzers of some kind, from which she could hurl depth charges to a distance of at least 1,000 yards. No one had ever warned him of this.

At 1:30 A.M. on the next morning, with infinite caution, they rose towards the surface. They found it was bright moonlight above, and the accursed sloop still there, right on top of them—waiting! Anticipating another dose of the depth charge, *U-19* was hurled down again to the sea bottom.

Matters were getting pretty serious. Spiess sat himself down on a folding chair, and tried to figure out exactly what his chances were. The moon set in one hour. That would be the last and only chance. If that failed, nothing for it but to open the Kingstons and throw themselves overboard. The last preparations were made. The commanding officer pocketed the few personal possessions he valued most, and then threw his last, desperate stake. At 2:30 A.M. he ordered the boat off the bottom. Using the last of his electric current, he began to crawl away. After minutes of nerve-racking suspense, he put his periscope up, found the world above in pitch darkness. The sloop was gone! He surfaced; the hatches were thrown open; the Diesels broke into their thundering march, and away he ran, alive—alive!—alive!

War in the under waters may have its horrors and tragedies, but it often contains elements of the comic and the absurd. Once Spiess was literally caught napping. He had taken his boat to an unfrequented area of the Baltic, to give his men a day's rest. The submarine was hove to; stores, showing signs of mildew, were brought up to dry. The men sprawled on deck, warming themselves like lizards in the sun. Spiess was drowsing over a book, when lifting his eyes, he saw the twin periscopes of a Russian submarine rise high out of the water, 500 yards away, and turn directly towards him. Tableau! The men, hugging boxes of stores, flung themselves, pell-mell, down the hatchways. Spiess, with one jump, got onto the top of the conning tower, bursting his suspenders en route. Regard for the modesty of our readers prohibits us from entering too deeply into further details. Suffice it to say that he had to con his boat through an emergency dive, whilst he held his trousers up with one hand. Outside of this most regrettable casualty to the nether garments of the commanding officer, the German submarine suffered no damage at all from the encounter.

We will pass over that memorable day when, by a well-intentioned warning message, Lieutenant Spiess sent the whole High

Sea Fleet to "Action Stations," to fight itself. Nor can we dilate on the peculiar episode of the Dogger Bank, wherein Spiess sank a 2,600-ton steamer himself, with shots from a rifle. Incredible as this may sound, we turn to the British official White Paper, "Merchantile Losses," and find that the event *did* take place, substantially as Spiess narrates it.

It may be news to many American naval officers that the British Isles were invaded by the Germans during the World War, but such a humiliation actually did take place. After the hair-raising encounter with the "hydrophone sloop," narrated above, Spiess found that his crew was badly rattled. During the daily practice dive, "serious mishaps" took place; the men could not, or would not, perform their duties properly. Later, a man on lookout aft nearly went mad with panic, completely failing to give warning when he sighted a British destroyer emerging, close at hand, out of a haze patch. With a frightful yell, he mounted the conning tower, and swarmed up to the top of the periscope. As the submarine began to dive, he was pulled down, crashed on the deck, and was stunned. Spiess, suddenly awakened, rushed into the central control station, and found a mob of demoralized men there, jabbering round the prone figure of the unconscious man.

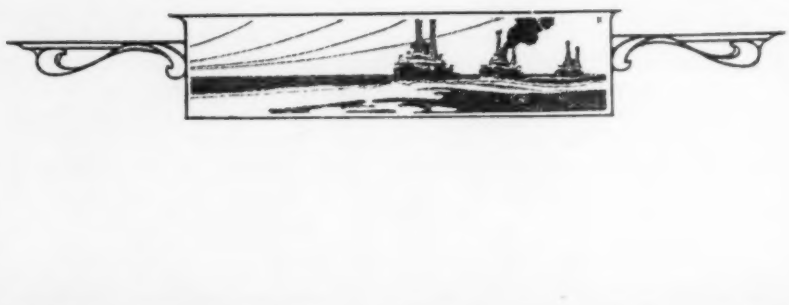
To divert the minds of his men from recent events, and to get his boat revictualed, Spiess decided to make a landing on the lonely island of St. Kilda, which stands out in the Atlantic, far to the west of Scotland. Once arrived there, he sent the "invading army" ashore. It consisted of four men, armed with rifles, all crammed into a small folding Berthon boat. It took a vast amount of ammunition and bad language, before four of the nimble sheep were shot. Upon this, it was found that four men and four sheep could not all be accommodated in the Berthon. So two of the sheep were heaved overboard and towed behind the boat. The porpoises, undeterred by rifle shots, chased and tried to grab the mutton of the tow for their own consumption. In the end, the landing party, with the spoils of its perspiring hunt, got back aboard *U-19*.

To officers in command of American submarines, might we be allowed to tender just one word of advice? On no account ever allow dead, sea-sodden sheep to be skinned and cut up on your decks! Lieutenant Spiess permitted this, and he regretted it. He had to retire in haste below, holding his nose. We suspect that, afterwards, he experienced further regrets. Besides themselves, the sheep appear to have brought other visitors on board. These minute and active additions to the complement soon became warmly attached to their new home, and evinced an eager, avid, and impartial affection for officers and seamen alike!

Classical history tells us that, before going to war, soldiers used to consult the Delphic Oracle, to discover what their future fortunes in battle might be. One and all, they received the same reply:

"Thou shalt go thou shalt return never in battle shalt thou perish!"

A cryptic reply, for the position of a single comma, before or after the word "never," makes the whole verdict favorable or the reverse. Happily for the German Lieutenant Spiess, Destiny had placed the comma, for him, in the right place. He went, he returned, never in battle did he perish. Hundreds of his fellow officers went, they returned never, in battle did they perish. So he survived, to give us a most entertaining and exciting narrative of his experiences in that great conflict, wherein the submarines of his service played so prominent a part, and contributed so much to the final downfall of his nation.



Courtesy U. S. Naval Academy

COMMODORE URIAH PHILLIPS LEVY, 1792–1862

Argus-Pelican Fight, War of 1812. The Scroll in his hand reads, "Author of the Abolition of Flogging in the Navy of the United States." Painting recently presented to the Naval Academy by Mrs. Carl von Mayhoff (See Secretary's Notes, Page 270.)

Distinguished Naval Academy Graduates in Civil Life

George Wallace Struble

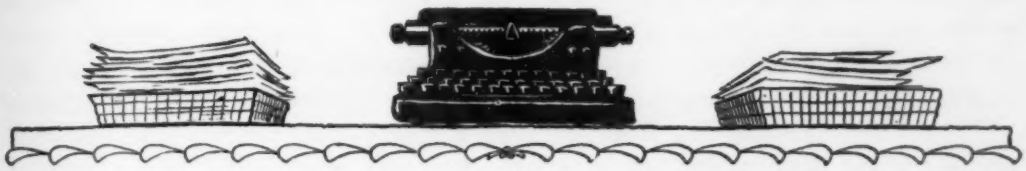
GEORGE WALLACE STRUBLE was born at Portland, Oregon, September 12, 1886. He was appointed to the Naval Academy from that state, graduating in 1908. He served on the U.S.S. *Idaho* and the U.S.S. *Montgomery* as a passed midshipman, and was commissioned ensign in 1910. After a brief tour on the U.S.S. *Lancaster*, he reported to the Bureau of Ordnance, Navy Department, and spent two years under instruction. He served on the U.S.S. *Minnesota* from 1912 to 1914, during which time he was promoted to lieutenant (junior grade).

He resigned from the Navy on October 2, 1914, and immediately accepted a position in the ordnance department of the Bethlehem Steel Company.

He was appointed superintendent of the Redington Plants of the Bethlehem Steel Company on February 19, 1915. This plant consisted of a proving grounds, a fuse manufacturing plant, and an ammunition assembling plant. He was elected manager of ordnance of the Bethlehem Steel Company, in charge of ordnance engineering and the sale of ordnance material, in June, 1919.

On August 1, 1927, he was elected vice-president of the Bethlehem Steel Company in charge of the sale of ordnance, steel passenger and steel freight cars and heavy machinery. Also in charge of the manufacture of miscellaneous machinery products of the Moore Plant of the Bethlehem Steel Company and the manufacture of passenger cars at the Harlan Plant of the Bethlehem Steel Company.

SECRETARY'S NOTES



Submarines

Few people outside the service realize the tremendous importance of submarines.

Due to the bad name given the subs during the late war, when they were employed against merchantmen and passenger ships by the Germans, many persons feel that submarines are an unholy weapon. But such is not the case, for subs can be used effectively without outraging the feelings of humanity.

Anyone who has watched their operations in the fleet maneuvers realizes that they are a real menace; not only are they a menace in themselves, but they also keep a large number of other types immobile, for smaller vessels must be used in protecting the larger units.

As defensive weapons, they give a measure of protection to nations whose surface navies are not able to cope with the larger surface navies. As offensive weapons, they are able to penetrate areas under control of the enemy, gain valuable information, and make attacks on enemy combatant craft. The mere knowledge that they are in the area is a constant worry and causes a redistribution of the other combatant types.

The submarine, like the airplane, is a product of American genius. Other nations have made full use of submarine warfare and we may expect them to do so again. Our submarine service should receive all the encouragement possible if we are to get full results from it.

A high degree of technical skill and lots of nerve is needed in the submarine service and our men have it. But in order for their high morale to be maintained the people of this country must appreciate what they are doing.

The old guard never surrenders

Probably no deliberative body in the world commands so much attention and respect as the Senate of the United States. It moves slowly but surely.

The people of the world wait upon its decisions as upon the decisions of a world court. Those who were waiting for the Senate to abandon the Monroe Doctrine got little comfort from its ratification of the Kellogg treaty.

In the cruiser crisis, those who hoped that the Senate would abandon nationalism for internationalism were bitterly disappointed. The active minority failed to influence the senior body.

But the fight is not over, by a long shot. Already plans are being laid to prevent appropriations for cruiser construction. It is up to the people of this country to stick to their guns and show that they approve the stand of the Senate, to beat down internationalism wherever it shows its head.

These United States have gotten where they are by their own efforts and not at the expense of other governments. We have been generous to others in their times of trouble. We have played the game and there is no reason for turning the control of our affairs over to others who have not as yet demonstrated that they are as capable as we are.

Bad business

We noticed the other day that the Canadian wood-pulp interests had made a contract with a newspaper syndicate in the United States, guaranteeing them the necessary wood pulp for the next five years, and also taking some sixteen million dollars worth of this syndicate's stock.

Now, we have nothing but respect for the Canadian people and, if it is necessary for the stock of our newspapers to be sold abroad, we know of no better people to buy it, *but,* it is bad business for our press to be owned even in part by foreigners.

Before we know it we may find influential newspapers, supposedly American, preaching the gospel of Europe. And who is to know that they are not expressing honest American opinion?

No one minds reading foreign opinions, as long as we know them as such, but we do object to them being forced upon us in the guise of American thought. The press has too vital a place in our affairs to travel in disguise.

Editorially speaking, we advocate that any publication having the privilege of the mails be required to publish its ownership in a prominent place each issue. Certainly if we can protect the public from fake medicines for the body, we can protect it from fake Americanism for the soul.

Catching at straws

It is interesting to follow the series of articles in the editorial columns of one of our newspapers. It is evidently anti-cruiser (for the United States) to the last ditch.

First, it fought the cruiser program on account of one John Smith, taxpayer.

Then, it did not want to start another armament race.

Next, when it was evident that the vast majority of the Senate was in favor of the cruiser program, it advocated not passing the bill in order to put the Tory party out of power in England! Just what was the reason for our interfering in English politics was not stated.

Then, if the program was passed, it advocated delaying building until the results of the building of the German cruiser *Ersatz Preussen* were more evident.

And finally, it appealed to the people to adhere to no time limit on the program, as advocated by the President, stating that he was the commander in chief of the armed forces of the United States and the best informed person in the country as to the international situation. We recall that the President advocated the cruiser program, but this paper did not support the President on *that* point, even if he is the best informed on the subject.

The London *Times* could not have made a more dogged fight.

The Navy and flogging

The following article by Professor Herman F. Krafft, curator at the Naval Academy, is interesting as a side light on discipline and its history in our Navy. It was only a few years ago that the use of "irons" as a method of punishment, was abolished.

"With the recent gift to the Naval Academy of a life-size portrait of Commodore Uriah Phillips Levy, we are reminded of the movement to abolish flogging in the U. S. Navy. Levy served on the U.S.S. *Argus* in the War of 1812 and was given command of one of her prizes. On the recapture of this prize, Levy and his shipmates were carried to England, where they spent sixteen months in the famous, or infamous, Dartmoor Prison. For the next forty years, owing mainly to his religion, Levy suffered much persecution, was court-martialed six times and was finally dropped from the list of captains. For similar reasons and after great provocation, Levy killed a man in a duel. At last, in 1855, after a review of his case by a court of inquiry, Commodore Levy was reinstated in his old rank. Always a great admirer of Thomas Jefferson, Levy in 1836 bought Monticello, which he intended to leave to the nation. Though his will was not carried out, his heirs in 1923 conveyed Monticello to the Thomas Jefferson Memorial Foundation, At the outbreak of the Civil War, Commodore Levy, then seventy years old, offered to President Lincoln his entire fortune, some three million dollars. The President expressed his gratitude but declined his offer—an offer indicative of the intense patriotism and broad humanitarianism of Commodore Levy. Levy's interest in the sailors under his command and his refusal to use the "cat," while illustrating his humanity, gave his enemies in the service a further proof that he was unfit to be an officer at a time when there was a wide gap between the forecastle and the quarter-deck.

"In the portrait above mentioned, which was presented by his niece, Mrs. Carl von Mayhoff, Commodore Levy holds in his right hand a scroll which bears the legend, 'Author of the abolition of flogging in the Navy of the United States'. Owing to his efforts and the efforts of other humanitarians in and out of the Navy, an antiflogging clause was added as a rider to the naval appropriation bill of 1850. Commodore R. F. Stockton of Mexican War fame, who was a U. S. Senator in 1851-3, introduced and advocated a bill by which flogging was still further restricted. On July 17, 1862, Congress outlawed flogging entirely.

"Even in Great Britain, the country that took the lead in Europe in humanitarian reforms, flogging was practiced with barbaric cruelty as late as the War of 1812. In his *History of the Navy,* Maclay gives some gruesome details of this practice in 1811 on board the *Macedonian,* Captain Carden, the ship which was captured the next year by the American frigate *United States* under Decatur. The culprit, a seaman, was charged by a midshipman named Gale, 'a rascally unprincipled fellow', with having stolen a handkerchief. The seaman was found guilty by a court-martial and sentenced to receive 300 lashes on his bare back. Seized up and in view of the whole ship's company of the *Macedonian,* he received the first sixty lashes. Then he was rowed to the next ship where the same performance was gone through with, and so on throughout the fleet until 'the surgeon at the end of 220 blows pronounced the prisoner unfit to receive any more'.

"Such was the discipline a century or more ago in the British Navy. The United States Navy, on the other hand, kept pace with the Constitution which forbade cruel and inhuman punishments. By a law passed by Congress in 1799 no commander, except on a decision of a court-martial, could inflict more than twelve lashes on the bare back of a sailor or marine. But even so, abuses sometimes grew to large proportions, according to Senator John P. Hale of New Hampshire, the leader in the Senate for the total abolition of flogging in the Navy and merchant marine. In the middle of the nineteenth century, a period of democracy and 'uplift' movements, Hale played the part of champion of the

oppressed. His biography tells us he was 'the only avowed opponent in the Senate of the slave system'. He managed to insert riders stopping flogging (1850) and later grog rations (1852) in the Navy. He also defended the leaders of the mob in Boston who had seized from the United States marshal and set free the negro slave Shadrach.

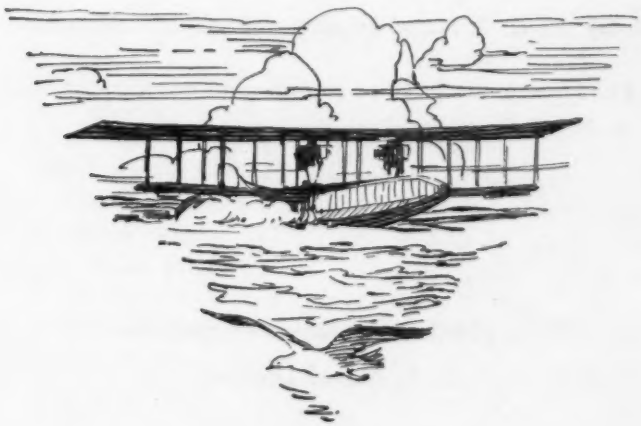
Captain Uriah P. Levy exhibiting the cat-o'-nine tails and describing its use to a group of statesmen in Washington. The abolition of corporal punishment in the U. S. Navy was largely due to his efforts. (Puck's Pictorial History.)

The antiflogging movement was coincident with prison reform and other humanitarian ideas, for example, Dana's efforts for seamen on merchant ships. It coincided also with the founding of the Naval Academy, a result of the hanging at the yardarm of a desperate character, Midshipman Philip Spencer, who had led a mutiny on the brig *Somers*.

"But flogging in the U. S. Navy was not abolished without a fight on the part of the heads of the Navy Department, who argued that it 'would be utterly impracticable to have

an efficient navy without this form of punishment.' They asserted that if flogging went by the board, discipline would follow. So many sailors would constantly be in the brig that ship's companies would be reduced to a dangerous degree. Furthermore the advocates of corporal punishment declared that the 'colt' (a whip on the unbared back) had really taken the place of the 'cat', which was used only in extreme cases. A 'vast number of memorials (opposing the change) were sent to the naval committee from the Eastern States'. The sailors themselves in some instances had submitted petitions against the 'reform' because the vicious and the shirkers among their numbers would leave all the work to the faithful if flogging was abolished. On the other hand, the reformers insisted that flogging was degrading to the individual and was 'white slavery'; that corporal punishment was stopped in the army and in many penal institutions; and that the use of the cat-o'-nine tails led to great abuse. Senator Hale instanced a case where a seaman had been sentenced by court-martial 'to receive 500 lashes and actually did receive 400'. This punishment was meted out to him in installments of twelve lashes, followed by the command to perform the previously refused duty. On each failure to perform this duty the whippping was automatically repeated until the sailor had received 400 cuts on his bare back.

"After the passage of the act the Secretary of the Navy, John P. Kennedy, reported (Report, Secretary of the Navy, December 4, 1852) that the better class of seamen refused to reënlist because they would have to do the work of the slackers. Therefore the Navy Department inaugurated new rules for recruiting and training sailors—rules that would make the service attractive to the better class of seamen. Accordingly, the next secretary of the Navy, J. C. Dobbin, reported much improvement in the enlisted personnel. It is interesting to note, therefore, that the naval apprentice system owed its beginning to what Secretary of the Navy Dobbin called 'this humane act'—the result largely of Commodore Levy's efforts."



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